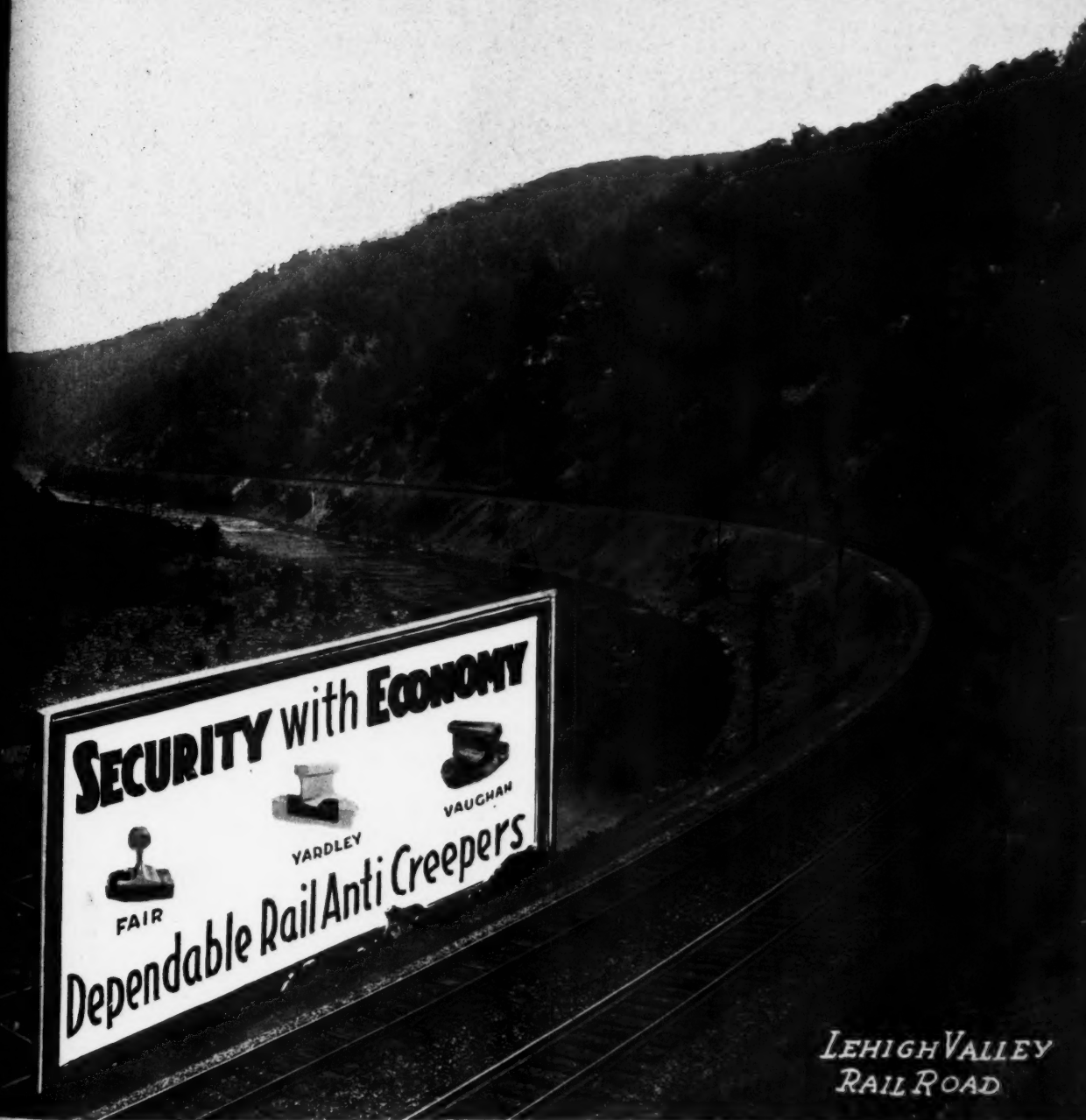
MARCH, 1925

Annual Labor Saving Number

Railway Engineering and Maintenance



CHICAGO THE P. & M. CO. NEW YORK

HY-CROME

COMPARABLE to the steady pull of a wrench is the reactive force of Hy-Crome—with a constant non-fatiguing pressure exerted against the nut—it cannot loosen.

Hy-Crome is the sure way of keeping rail joints permanently tight.

THE RELIANCE MFG. CO.
MASSILLON, OHIO

NEW YORK CLEVELAND DETROIT CHICAGO
ST. LOUIS SAN FRANCISCO

N. S. Kenney, Munsey Bldg., Baltimore, Md.
Montreal, Quebec, Canada, McGill Bldg., Engineering Materials, Ltd.

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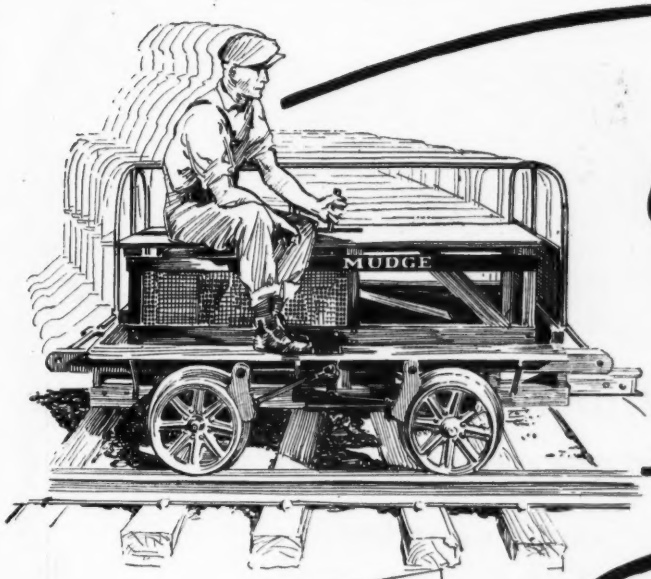


What Operators Say about Mudge Motor Cars!

THE men who operate motor cars day in and day out in all classes of service are undoubtedly qualified to judge of the actual value of any motor car. They know the requirements. They know the car. And they know how well the car answers to what is required of it. We reproduce here but a few of the many thousands of enthusiastic endorsements of MUDGE cars by the actual operators themselves. They are in a position to know, and do know, and do not hesitate to say that MUDGE cars are good cars.

Such voluntary testimony means much to us. It proves that we are realizing our ambition—building motor cars of power, economy and durability. Such testimony should mean much to every user of motor cars also, as it points the way to lower maintenance costs and the highest type of motor car service.

The Mudge line comprises a complete line of railway inspection and section cars; side drive or center load; direct connected or free running; air cooled or water cooled motor.

Mudge & Company

Manufacturers
Railroad Equipment
RAILWAY EXCHANGE BLDG.
CHICAGO
U. S. A.

The HORTON Softening Plant

Features of Horton Softening Plants Now Generally Accepted

AFTER only two years, the principal features of the Horton softening plant have been largely accepted by railroad engineers and officials.

The conical-bottom tank has been recognized as the best shaped tank for settling purposes.

Ground operation, as incorporated in the Horton plant, has been widely approved.

Rapid and inexpensive sludge removal is now regarded as a necessity, rather than as a luxury seldom to be enjoyed.

The simplicity of the Horton plant has commended itself to many.

And most important, the performance of this plant in actual service has proved that it is efficient, reliable and economical.

We shall be glad to tell you more at the Railway Show, exhibit spaces 50½ and 51.

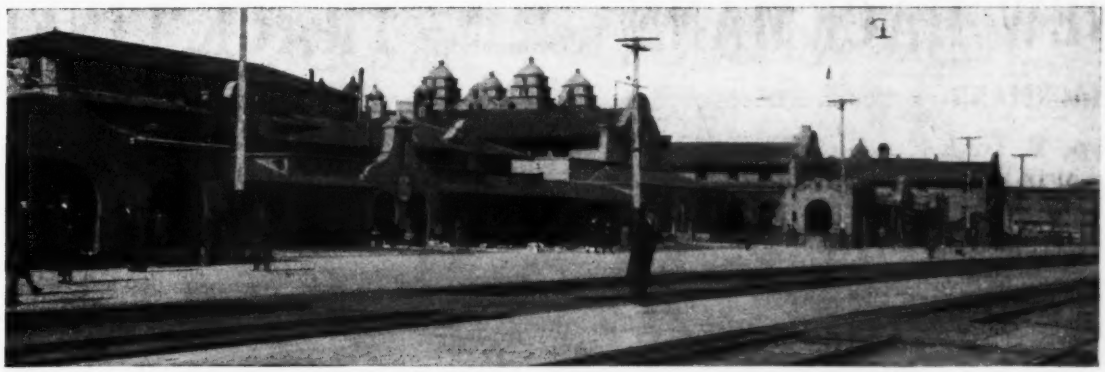
CHICAGO BRIDGE & IRON WORKS

CHICAGO 2452 Old Colony Building | NEW YORK 3156 Hudson Terminal | DALLAS 1646 Praetorian Building | SAN FRANCISCO 1007 Rialto Building | ATLANTA 1036 Healey Building

HORTON

SOFTENING PLANTS AND ROADSIDE DELIVERY TANKS

376



The Alvarado Hotel on the Santa Fe at Albuquerque, N. M.

Railway Engineering and Maintenance

Formerly the Railway Maintenance Engineer

Vol. 21 March, 1925 Number 3

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WOULD YOU LIKE TO KNOW

What the prospects are for labor this year?

What the managements expect from the use of mechanical devices?

Why pipe lines freeze during a thaw?

The effect of permanent bridge construction on maintenance?

How to increase the production of work equipment?

Answers to these and other questions will be found in this issue.

EDWARD A. SIMMONS, *President*
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In sending us change of address please be sure to send us your old address as well as the new one.

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Railway Engineering and Maintenance is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulation (A. B. C.)

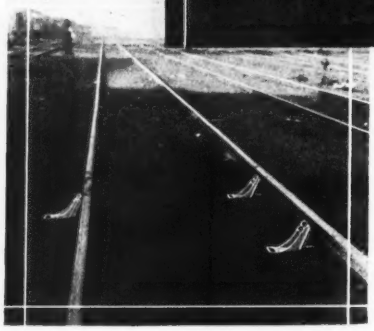
NEW HACKMANN Type-B Combination TRACK LINER

HACKMANN

Type B Track Liners Will Line Track, Frogs, Switches, Space Ties, Raise Low Joints, Without Disturbing the Road Bed, No Digging Necessary

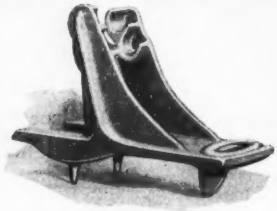
50%
Labor Cost Saved

3 Men With Hackmann Type B Track Liners Do the Work That Required 7 Men Under the Old Method Hackmann Track Liners Will Pay For Themselves By the Saving in Labor Cost



NOT NECESSARY TO REMOVE HACKMANN BASES UNDER TRAFFIC

NOTE THE TWO STEP FEATURE AT TOP OF BASE

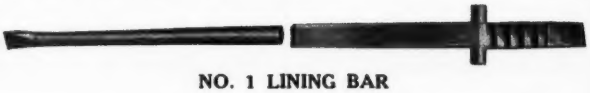


Weight 20 lbs.

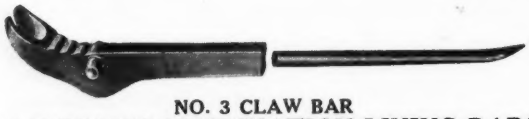
3 men with 3 Hackmann Type B Liners will keep track lined, joints surfaced and ties spaced.

THE HACKMANN COMBINATION LINING BARS AND BASES SAVE 50% OF YOUR TOOL COST

NO. 2 TAMPING AND LINING BAR



NO. 1 LINING BAR



NO. 3 CLAW BAR

LINER IN SLIDING POSITION

HACKMANN COMBINATION LINING BARS (VERONA MADE)

The No. 1 lining bar with chisel end, the No. 2 combination tamping and lining bar and the No. 3 combination claw bar with chisel end, are all drop forged from special steel specially tempered with 1-inch drop forged lugs as an integral part of the bars, for use with Hackmann bases.

Tests on different roads have proven conclusively that the new Hackmann Type B Combination Track Liner gives more than double the efficiency of any liner now on the market.

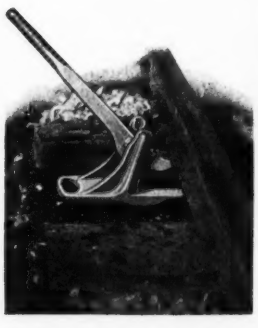
DEMONSTRATIONS

We Will Gladly Demonstrate the Efficiency of This Equipment Upon Request

The Hackmann Track Liner Co.

Railway Labor Saving Devices

723 South Wells St. **Chicago, Ill.**



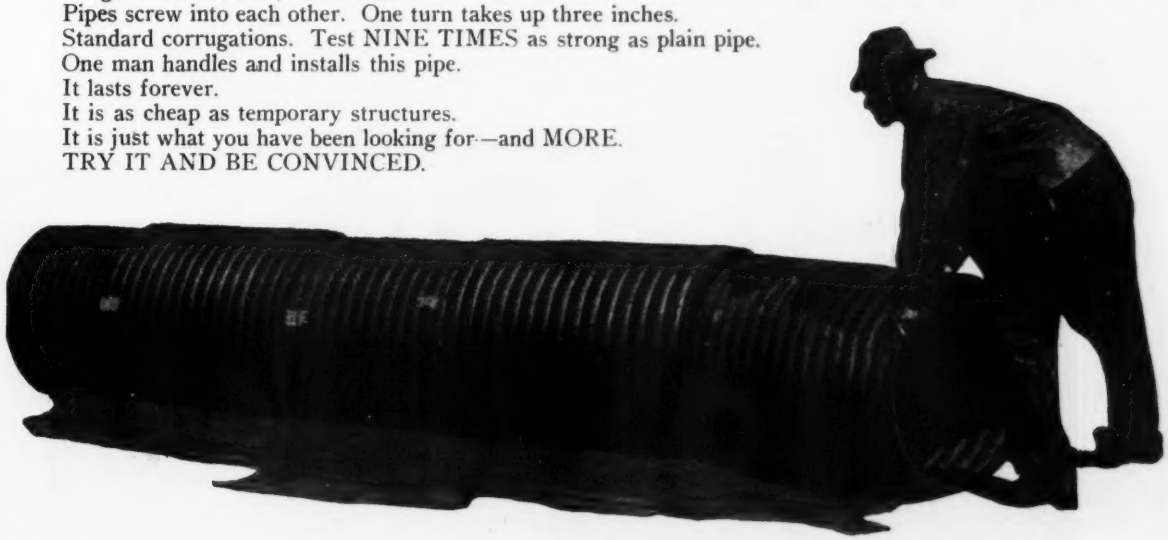
TYPE B IN LIFTING POSITION

Introducing "THE MISSING LINK"

SPIRAL CORRUGATED CAST IRON CULVERT PIPE

Snappy Facts About It

Solid, round, vertically cast, pure remelted pig iron. *No scrap.*
Lengths of three feet, three inches.
Pipes screw into each other. One turn takes up three inches.
Standard corrugations. Test NINE TIMES as strong as plain pipe.
One man handles and installs this pipe.
It lasts forever.
It is as cheap as temporary structures.
It is just what you have been looking for—and MORE.
TRY IT AND BE CONVINCED.



Entering the Pipe by Rolling in on an Angle.

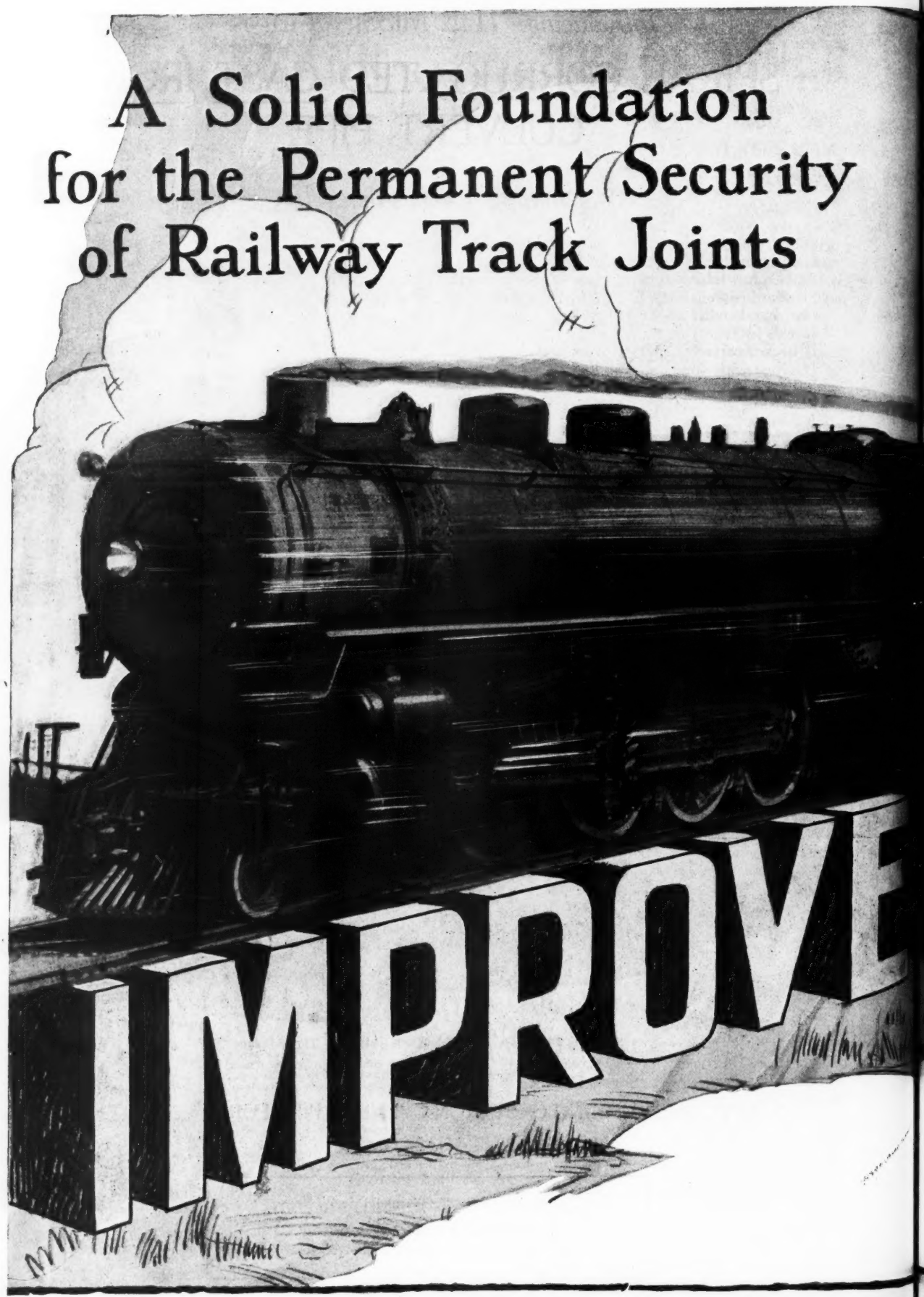
Screwing Pipe Together. One Turn Takes Up Three Inches

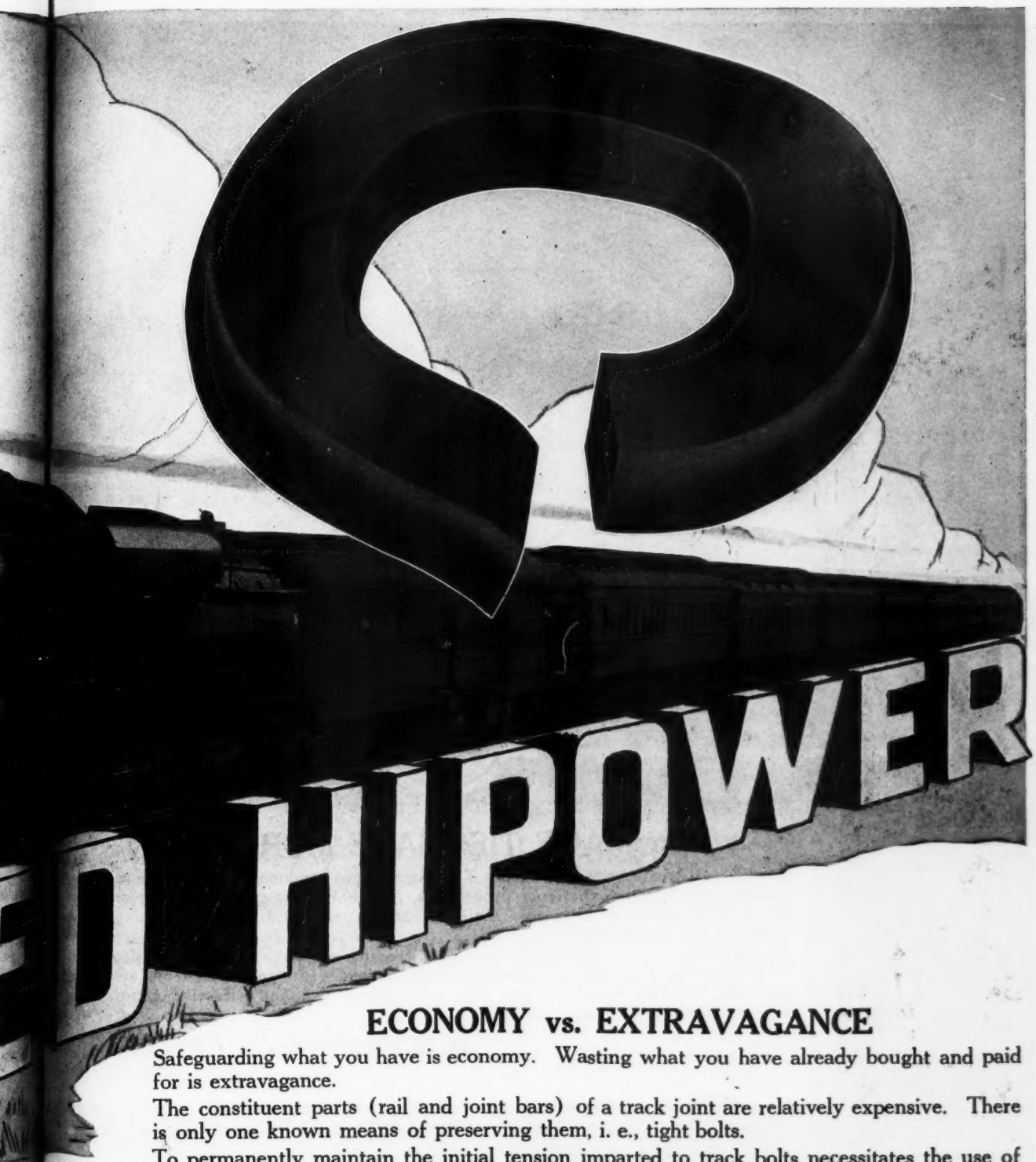
WE HAVE BEEN MAKING CAST IRON CULVERT PIPE FOR TWENTY YEARS

Write for Details and Prices

American Casting Company

Box 591 BIRMINGHAM, ALA.


A Solid Foundation
for the Permanent Security
of Railway Track Joints
IMPROVE



ECONOMY vs. EXTRAVAGANCE

Safeguarding what you have is economy. Wasting what you have already bought and paid for is extravagance.

The constituent parts (rail and joint bars) of a track joint are relatively expensive. There is only one known means of preserving them, i. e., tight bolts.

To permanently maintain the initial tension imparted to track bolts necessitates the use of

IMPROVED HIPOWER

It's a physical impossibility for ordinary nut locks to preserve track joints.

The National Lock Washer Co.

Newark, N. J., U. S. A.

MAKE TIES SAVE MORE

Sound, well treated ties save labor. They last longest, reduce tie renewals and give lowest annual cost. Experience proves this. You have only to examine the annual tie renewal records of railroads. A tie life of 20 years and more is consistently reported for treated ties.

Sound timber deeply penetrated with good creosote oil is the answer. The problem of making ties last longer has therefore been solved. But today there is another problem, that is, where to get full size, sound ties and effective treatment. *International* solves this problem.

INTERNATIONAL CREOSOTING
GALVESTON,

Intern
Standard Spec

BUY TIES THAT LAST LONGEST

International stands for highest quality—sound timber, scientific production methods, accurate grading, honest treatment, prompt service and permanent interest. Sounds big and really is.

Conservative and careful purchasers specify *International* Ties not alone for their high quality, but also for the protection they secure of full compliance in every respect with the A. R. E. A. Standard specifications. *International* interprets it as its duty to deliver ties exactly as you specify them.

Don't take chances—it isn't necessary.

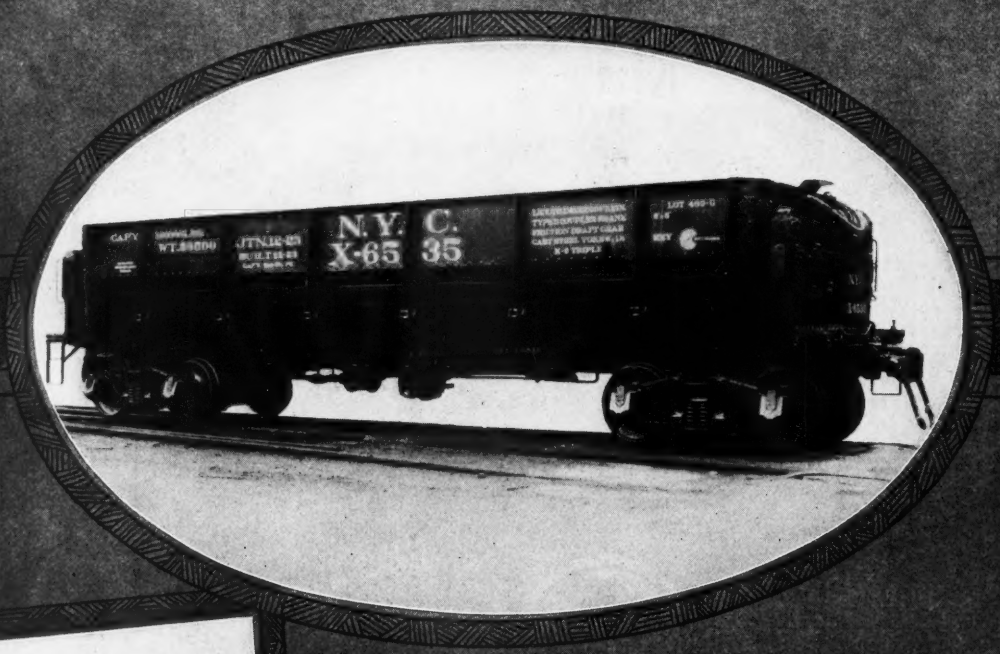
AND CONSTRUCTION COMPANY

TEXAS

ational

cation Ties

Extension Side



EXTENSION Side Dump Cars are ideally adapted to a wide range of railroad dumping service.

They embody distinctive working features which reflect great savings in time and labor in cinder service, ditcher service, bank widening, rip-rapping, bridge filling and general construction work.

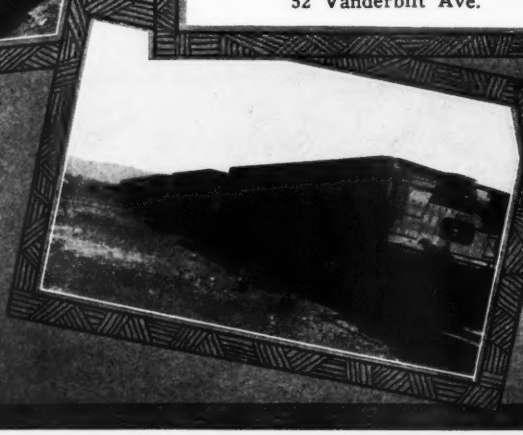
The instantaneous pneumatic dumping and effective delivery of the load makes possible the handling of big yardages at exceedingly low costs.

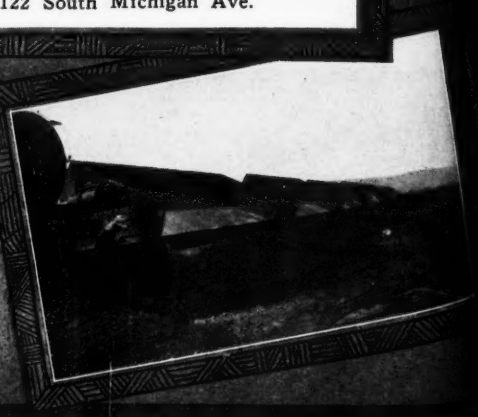
CLARK CAR COMPANY

Oliver Building, Pittsburgh, Pa.

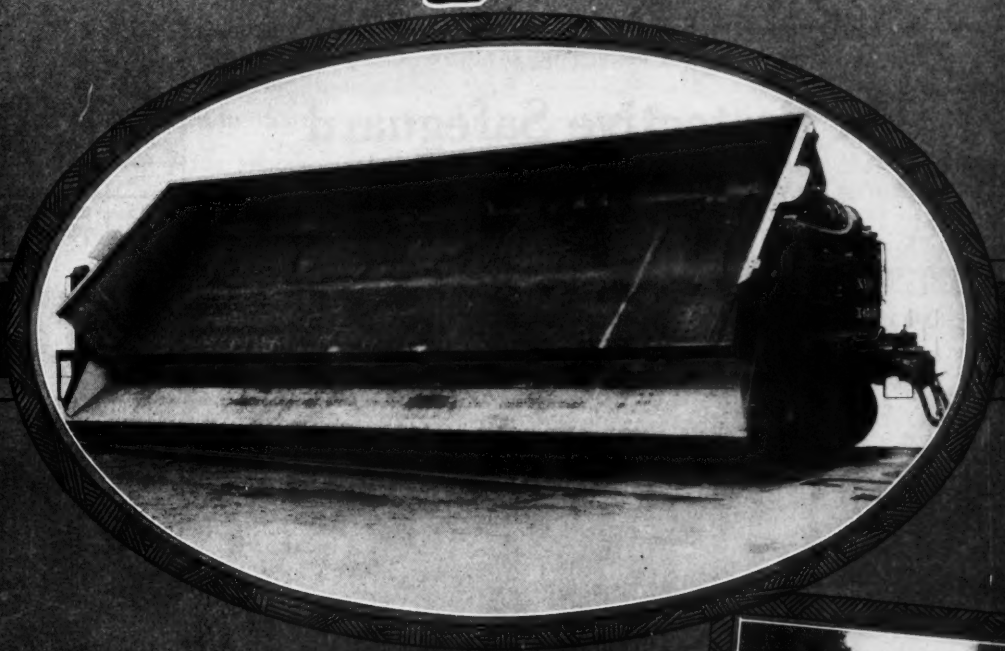
New York Office
52 Vanderbilt Ave.

Chicago Office
122 South Michigan Ave.





Dump Cars



DOWN TURNING DOOR. The side or door of the car opens outwardly and downwardly as the body moves to full dumped position, to permit free and unobstructed discharge of the load.

EXTENDED DOOR. The door in full dumped position serves as an extension to the car floor, delivering the load clear of trucks and track.

TRAIN DUMPING. Cars are air operated and may be dumped in opposite directions simultaneously.

DUMPS WITH ROLLING MOTION. The movement of the body to full dumped position is a rolling motion. There is no excessive shock.

LOCKS AUTOMATICALLY. When body is returned to upright position it automatically locks.

Booth No. 115, Coliseum

You are cordially invited to call.

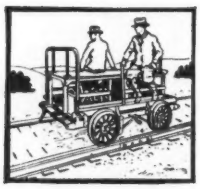
BUDA
ESTABLISHED
1881

Safety Crossing Gates

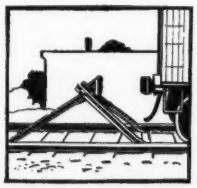
Electric, Pneumatic, Mechanical Lever and
Crank Types

A Protective Safeguard

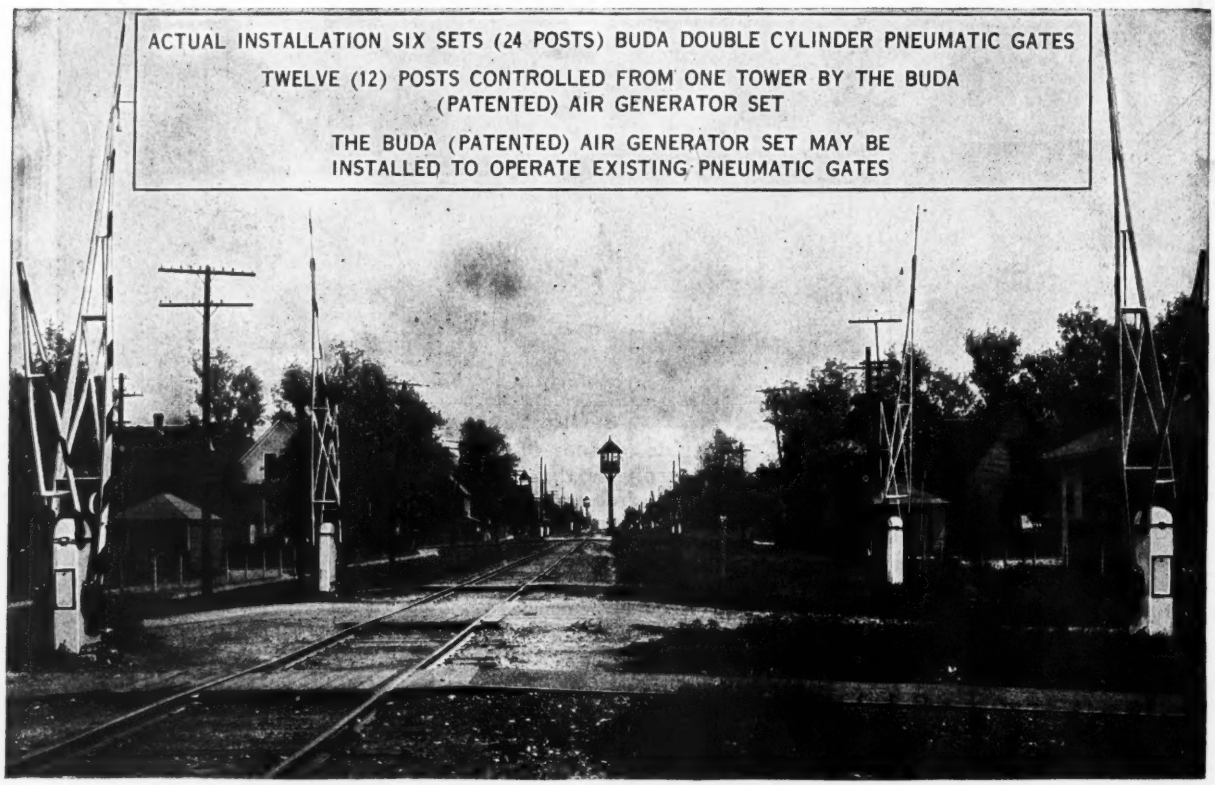
at street and railway crossings
drawbridge approaches



Railway Motor Cars



All Steel Bumping Posts


ACTUAL INSTALLATION SIX SETS (24 POSTS) BUDA DOUBLE CYLINDER PNEUMATIC GATES
TWELVE (12) POSTS CONTROLLED FROM ONE TOWER BY THE BUDA (PATENTED) AIR GENERATOR SET
THE BUDA (PATENTED) AIR GENERATOR SET MAY BE INSTALLED TO OPERATE EXISTING PNEUMATIC GATES

SIMPLE IN CONSTRUCTION
FEW MOVING PARTS
ACCESSIBLE TO ADJUSTMENT
LOW MAINTENANCE COST

Ratchet Jacks — Cone and Ball-Bearing Jacks

Track and Bonding Drills

THE BUDA COMPANY

HARVEY [CHICAGO SUBURB] ILLINOIS

30 Church Street NEW YORK
Railway Exchange CHICAGO
Railway Exchange ST. LOUIS
664 Mission St. SAN FRANCISCO
LONDON

Booths 45-46-47-64-65-66 Coliseum March 9-12 Inclusive

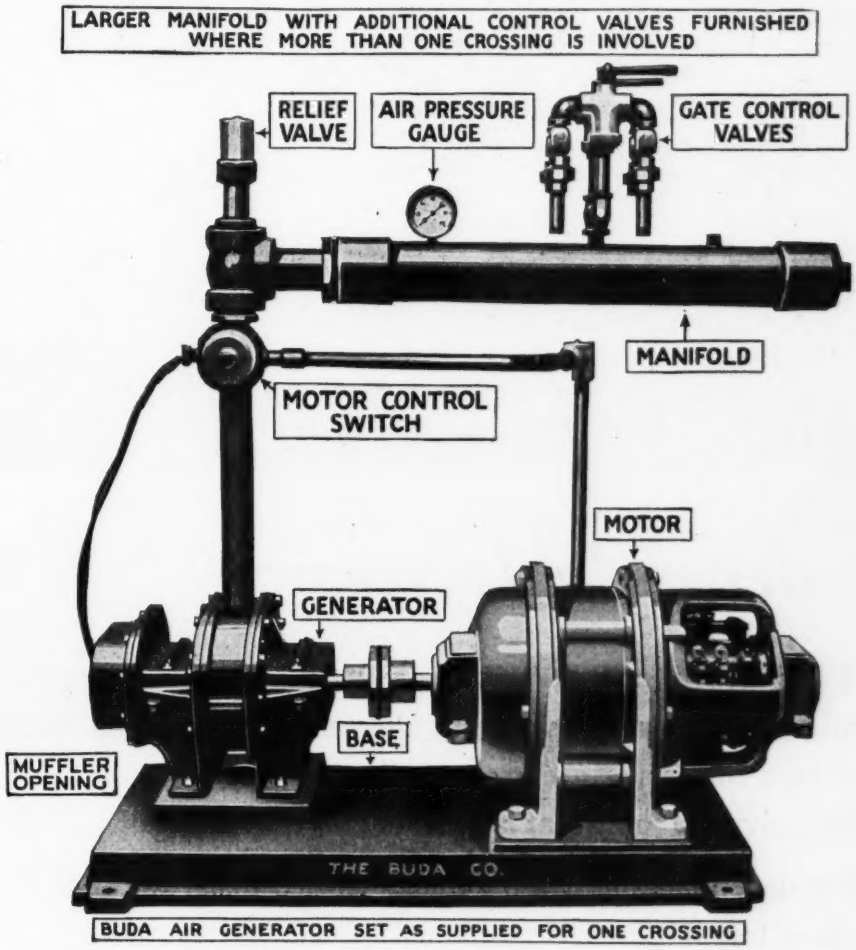
BUDA
ESTABLISHED
1881

Air Generator Set

An innovation and notable improvement over the ordinary electric air compressor for operating pneumatic crossing gates (cylinder or diaphragm types) equipped with extremely long roadway arms and especially where two or more sets of gates are operated from one tower.

All air gates so controlled, Buda or others, require but slight physical effort in operation, with better and quicker control. The breakage of gates arms is altogether minimized.

Equipped with Motor for Available Current



BUDA AIR GENERATOR SET AS SUPPLIED FOR ONE CROSSING

Generates Air Only as Required

The Buda Air Generator Set eliminates

AIR STORAGE TANKS REDUCING VALVES AUTOMATIC CONTROL

Reduces cost of current 75 percent in comparison with electric air compressor.

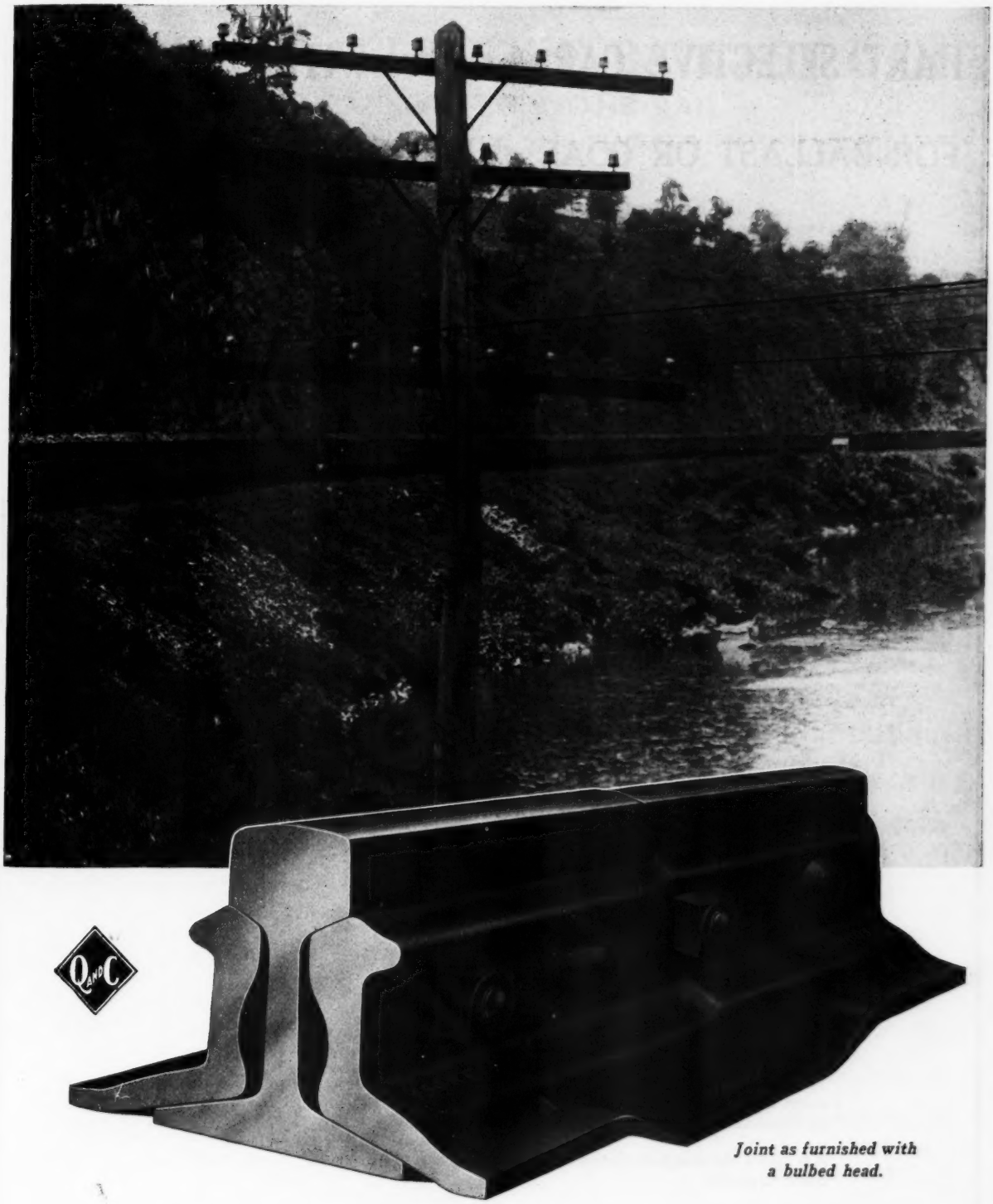
for dependable service

Q & C Rolled Steel Step Joints will give dependable service under all traffic conditions. In strength and safety they are unexcelled due to the fact that they are made of rolled steel, heat treated when specified, giving a joint that is as strong as the rail itself.

For dependable and economical service insist on Q & C Rolled Steel Step Joints.

THE Q & C COMPANY, 90 West St., N. Y. C.

Peoples Gas Bldg. - - - - - Chicago
Railway Exchange Bldg. - - - - - St. Louis



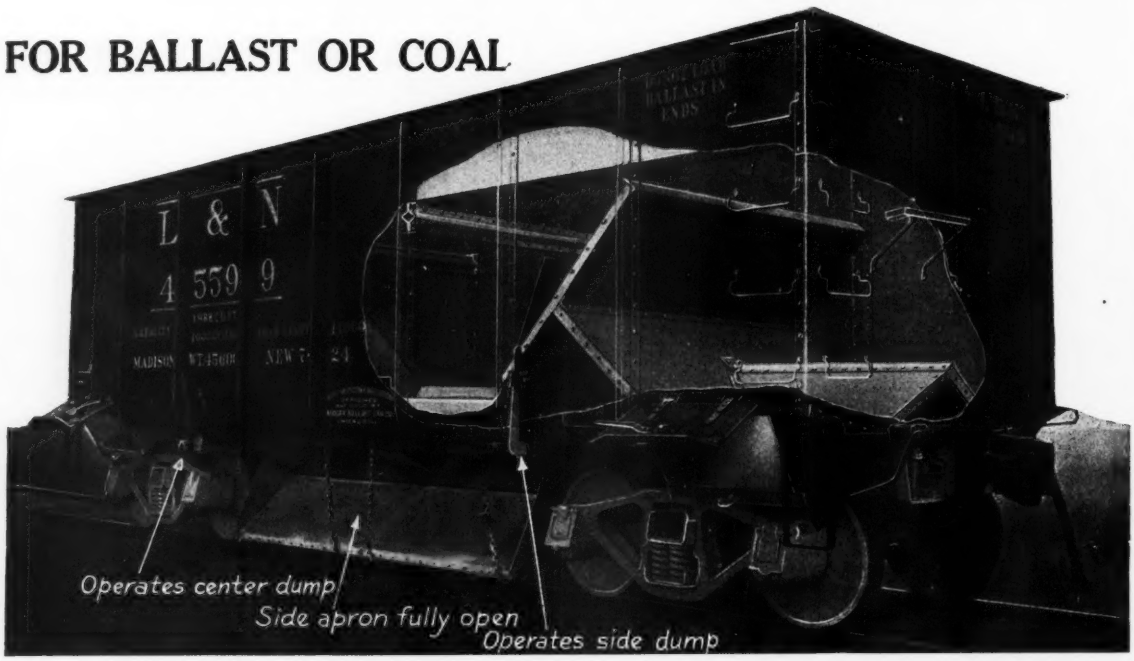
Joint as furnished with a bulbed head.

By our process of manufacture, we successfully overcome many difficulties quite common with the ordinary step or compromise joint. We can furnish a joint for practically any combination of tee rails, and can also allow for wear on the worn rail heads when specified. This guarantees the best possible commercial fit.

Booths 120 and 139 at the March Convention

HART SELECTIVE CAR (Hopper Type) WITH "MAXENDS"

FOR BALLAST OR COAL



NO CONVERTIBLE PARTS

At the time and place of unloading you may, without any prearrangement of the car, unload in any of these ways:

Side Dump — One Side

Side Dump — Both Sides

Center Dump

Center Dump and to One Side

Center Dump and to Both Sides

The Hart Selective Car is designed to give the Maintenance of Way Department all of the facilities required for any class of ballasting. Some of these facilities afford service not hitherto performed by any car.

It is also a thoroughly efficient coal-carrying car. "Maxends" furnish maximum cubic capacity.

Many of these cars are in daily service ballasting during the summer months and carrying coal during the winter.

Built as a Hopper Car or as a Gondola Car and of steel or composite construction.

RODGER BALLAST CAR COMPANY

523 RAILWAY EXCHANGE 80 E. JACKSON BLVD. CHICAGO, ILLINOIS

THE HART SELECTIVE BALLAST CAR

IT CANNOT FLOOD THE RAIL

Places ballast where it is wanted
in any required amount.

The accompanying illustrations show samples of actual work done with this car, dumping in the center of track only, and to the center and both sides.

The same car will dump to either side alone, or to both sides, or to center and one side without conversion. It is always ready for any kind of a job.

We shall be glad to send full particulars.

RODGER BALLAST CAR COMPANY

523 RAILWAY EXCHANGE 80 E. JACKSON BLVD. CHICAGO, ILLINOIS

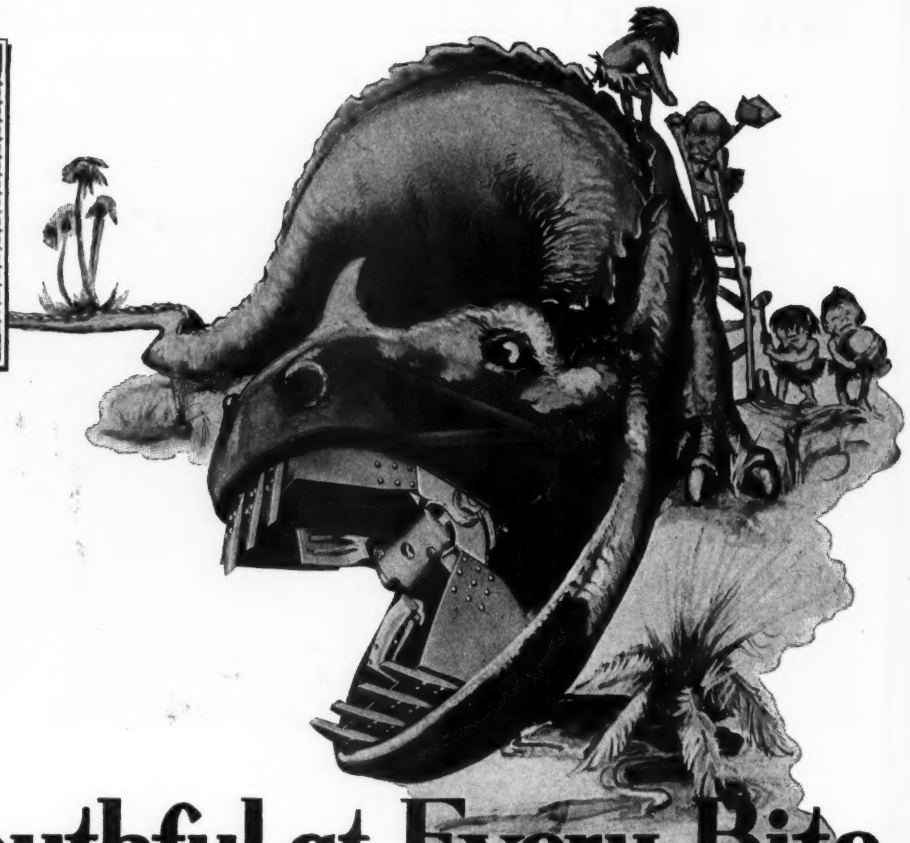
Guarantee

Owen Buckets, properly installed and operated, are guaranteed to do a bigger day's work than any other bucket of the same weight and capacity—

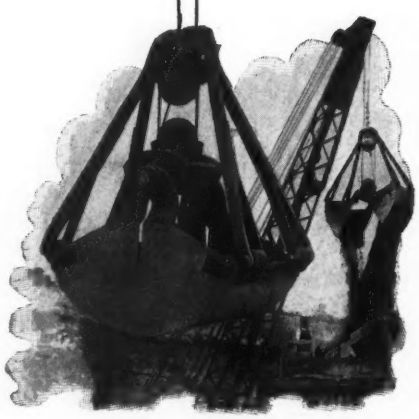
—or—

Write your own guarantee!

OWEN BUCKET CO.



A Mouthful at Every Bite



1 yard Type "O" Bucket owned by A. Lanese, Cleveland, Ohio, and used for excavating purposes in a gravel bank. Owen grit-proof bearings have five times greater life when handling gritty materials such as sand and gravel in the pit.

The ancient Dinosaur made his living by getting a mouthful at every bite. Imagine, if you can, a clamshell bucket with the power of his mighty jaws. That's Owen Buckets all over.

You can't have a Dinosaur on your job, but you can have an Owen—superior in many ways, because it can be controlled.

Now let us see just what makes the Owen Bucket superior.

1. The simple yet efficient design of the bucket enables the cutting edges to hit the material first without breakage, thereby increasing the digging efficiency of the bucket. This is done by means of a "cushion stop" which is explained in our literature.

2. 60% of the weight of the bucket is located along the center shaft—concentrated where it forces the jaws into the material AS THOUGH IT WERE ANCHORED TO THE GROUND.

These are two points of superiority. Among others are grit-proof lubrication of all bearings, more efficient hinge design, great strength and durable construction, adjustable and equalized digging power, and many, many others.

The man who uses Owen Buckets on his work is insured a greater working day, greater loads, greater profits, greater economy of operation, and all around greater satisfaction.

Our Guarantee means everything it says—folder 1-A will prove that Owen Buckets can do these things.

THE OWEN BUCKET COMPANY

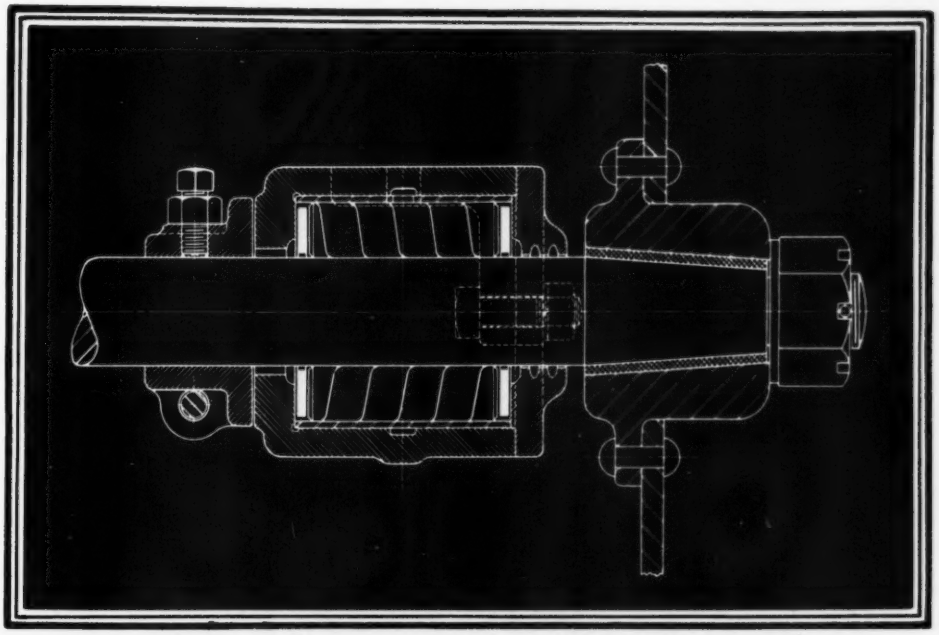
305 ROCKEFELLER BUILDING CLEVELAND, OHIO

OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAY'S WORK

Owen Buckets

INSURE A BIGGER DAY'S WORK

C. O. B. Co.



Typical mounting of Hyatt roller bearing in journal box for railway maintenance cars

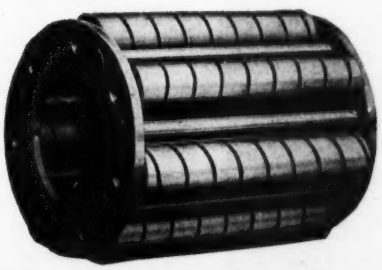
Simple Construction Means Carefree Performance

THE characteristic simplicity of Hyatt roller bearings and the simple manner in which they are mounted are of basic importance to maintenance car builders and users.

There are no complicated parts to get out of order and no adjustments to make under any circumstances. Hyatt bearings operate for years with no attention other than occasional oiling—and without appreciable wear.

Coupled with easy running and substantial fuel economy, these qualities have made Hyatt bearing cars the recognized standard.

It is easy to get Hyatt equipment. Leading maintenance car manufacturers are prepared to furnish types of cars to meet all requirements, as well as Hyatt bearing replacement boxes for converting plain bearing cars.



The successful use of Hyatt bearings in heavy railway cars is also attracting the attention of railway men. Write for information on this important development.

HYATT ROLLER BEARING COMPANY

NEWARK DETROIT CHICAGO SAN FRANCISCO
WORCESTER PHILADELPHIA CHARLOTTE
PITTSBURGH CLEVELAND MILWAUKEE

HYATT ROLLER BEARINGS FOR RAILWAY MAINTENANCE CARS

"Removability"

BECAUSE each brick in an asphalt-filled brick pavement is an easily removable unit, a vitrified brick pavement has virtually 100% salvage value even after years of usage sufficient to wreck inferior construction.

In other words, whenever you need to move a drive, abandon a loading yard or change a platform, if the pavement is vitrified brick, asphalt-filled, nothing goes to the scrap-pile.

Many a vitrified brick pavement in hard service has been in use thirty years.

VITRIFIED
Brick
PAVEMENTS

OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO

Alton Brick Company
Alton, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Central Clay Products Co.
(Distributors MACK Paving Brick)
Wilkes-Barre, Pa.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Francis Vitric Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hisylvania Coal Co.
Columbus, Ohio
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Metropolis Paving Brick Co.
Pittsburg, Kansas
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Brick Co.
Mineral Wells, Texas

Moberly Paving Brick Company
Moberly, Mo.
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Peebles Paving Brick Company
Portsmouth, Ohio
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
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Thurber Brick Company
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Toronto Fire Clay Company
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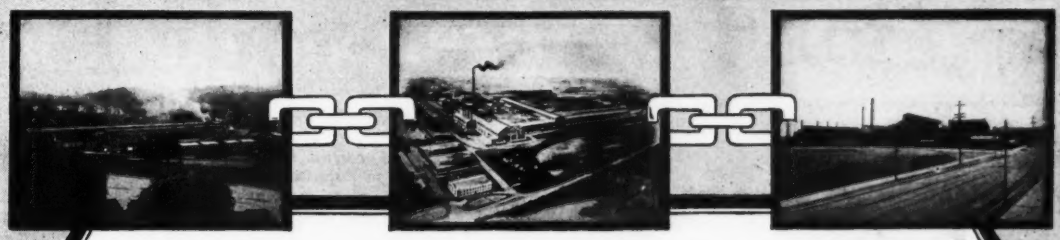
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
Veedersburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.



High Bridge, N. J.
Manganese Steel
Wearing Parts.
Chain.

Easton, Pa.
Special Trackwork.
Cylinders for Gases.
Hollow Rollers.

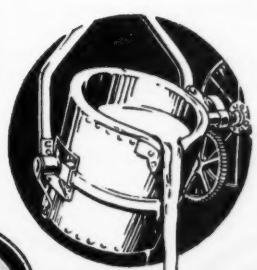
Philadelphia, Pa.
Rolls and Rolling
Mill Machinery.
Forgings.

WHARTON

Trackwork of manganese steel was first introduced by this company in 1900. Every railroad man knows Wharton trackwork. The remarkable results obtained have repeatedly demonstrated the superiority of this metal, particularly for track subject to heavy duty.

We are prepared to furnish designs suited to the individual standards of railroads, or special designs as requested. All work is fitted together, laid out completely, tested as to measurements, and carefully inspected before shipment.

Switches—Frogs—Crossings—Special Trackwork



WM. WHARTON, JR. & CO., Inc.
Easton, Pa.

TISCO

Du Pont chemical engineers insure uniformity of quality by chemical control through every step of manufacture from raw material to finished product.

How chemical control insures du Pont quality

DU PONT explosives do just what you expect of them—just what you want them to do—because they are absolutely uniform in quality and adapted to your requirements.

To insure du Pont explosives being of the highest quality, the du Pont Chemical Engineers watch every manufacturing step for ***you.*** By chemical control of materials and processes, they assure you of unvarying du Pont quality. It is the maintenance of uniform quality that has given the du Pont Company the reputation it enjoys today in the explosives field.

Certainty in blasting results is obtained by the selection of the ***right*** type of explosive and its proper use.

Blast with du Pont Explosives

There is a du Pont explosive to meet every blasting need—to do ***your*** particular work ***best*** at ***least*** expense. For contracting we especially recommend:

Red Cross Extra Dynamite: 20% to 60% strength; low-freezing; fairly water-resisting; heaving and lifting action.

Du Pont Gelatin Dynamite: 25% to 90% strength; water-resisting; low-freezing; dense; plastic; less obnoxious fumes.

Du Pont R. R. P. (Judson type): 5% strength and low-freezing.

Du Pont Blasting Powder is the most widely used low-explosive. It is regarded as standard everywhere. Every keg bears the orange band.

Du Pont Blasting accessories give you maximum efficiency from your explosives. Make every shot ***sure*** —protect your blasting investment by using only du Pont accessories.

For further information about du Pont explosives and Blasting Accessories, please refer to *Road and Street Catalog*—or write to our nearest office.

E. I. DU PONT DE NEMOURS & CO., INC.
Explosives Department Wilmington, Delaware

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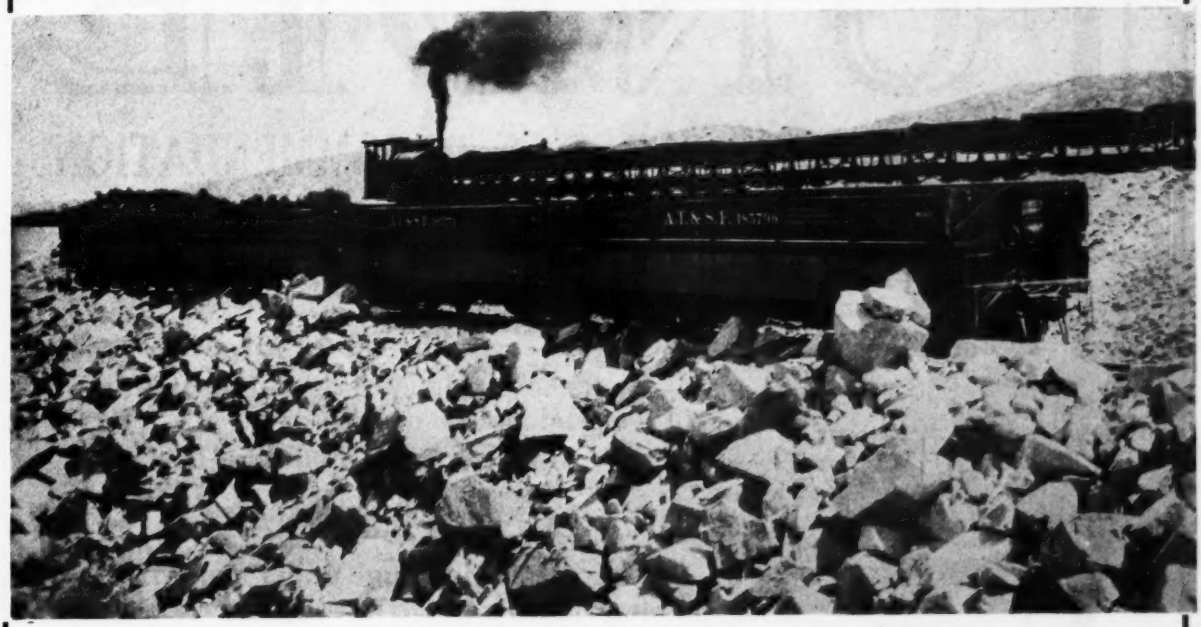
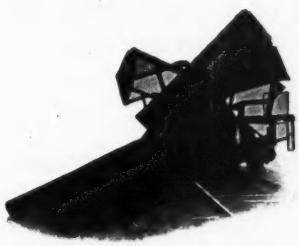
Du Pont Products Exhibit Atlantic City, N. J.

POWDER MAKERS SINCE 1802

Labor-Saving Facts



Railroad construction in California. On the right, train o f narrow gauge Western Dump Cars making a fill. On the left, 30-yard Western Air Dump Cars, with aprons, engaged in rip-rap work. Note the material handled.



Let us refer you to railroads who are saving labor and money by using these superb Western Air Dump Cars equipped with the Western Extension Floor or Apron. Look for the facts and when you have found them you will install Westerns.

HERE is what we build and what you want: An Automatic Air Dump Car with an Apron to throw the load beyond the ties, protecting the ballast and saving labor on the dump.

A Two-Way Dump Car which you can dump to the right or left without change of cylinders or other labor or preparation. You can dump the load instantly where you want it and when you want it.

A Labor-Saving Dump Car which can be righted instantly without shovelling off the apron or moving up the train.

Western Air Dump Cars have other advantages of design and construction which give long life, dependable service and low cost of upkeep. Study the facts. When you know the facts you will install Westerns.

Western That's Why

Western Wheeled Scraper Company

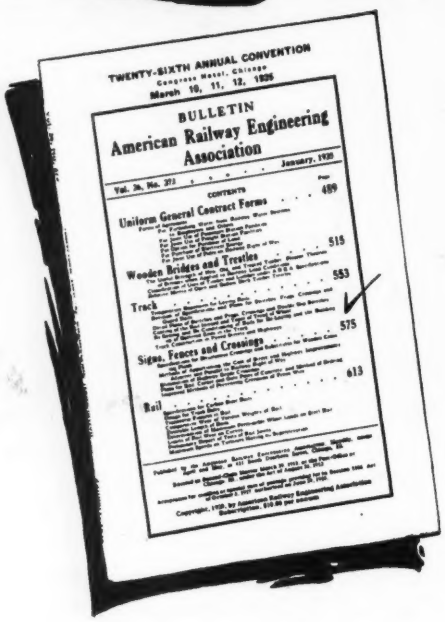
Founded 1877

Earth and Stone Handling Equipment

AURORA, ILLINOIS

LUNDIE

MEETS A. R. E. A. RECOMMENDATIONS


TWENTY-SIXTH ANNUAL CONVENTION
Congress Hotel, Chicago
March 10, 11, 12, 1925

BULLETIN
American Railway Engineering Association

Vol. 26, No. 273 January, 1925

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AS appears on page 566 A. R. E. A. Bulletin No. 273.

1. Rail should be canted inwardly.
2. Inclined tie plates should be used to produce the desired cant.
3. Amount of cant should be 1 to 20.

LUNDIE TIE PLATES

Maintain rigid gauge under every traffic condition—Do not slip nor rattle.

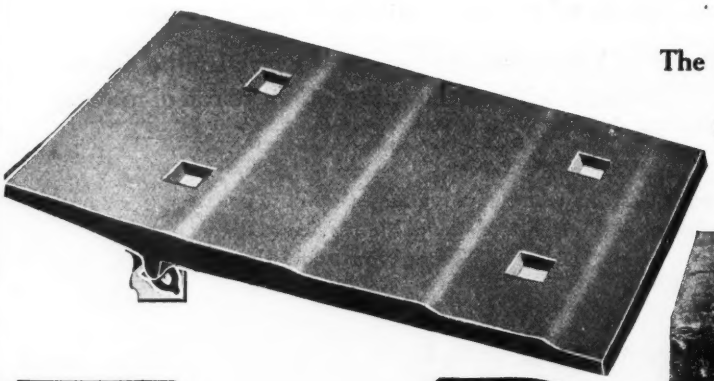
Insure uniform wear on head of rail, increasing rail life.

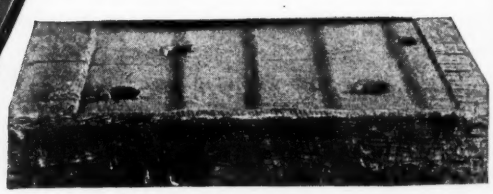
Prevent the cutting of a single fibre of the tie, ensuring maximum tie life.

Reduce flange wear.

Reduce wear on wheels.

Give greatest efficiency—over longer periods at lowest cost of maintenance.

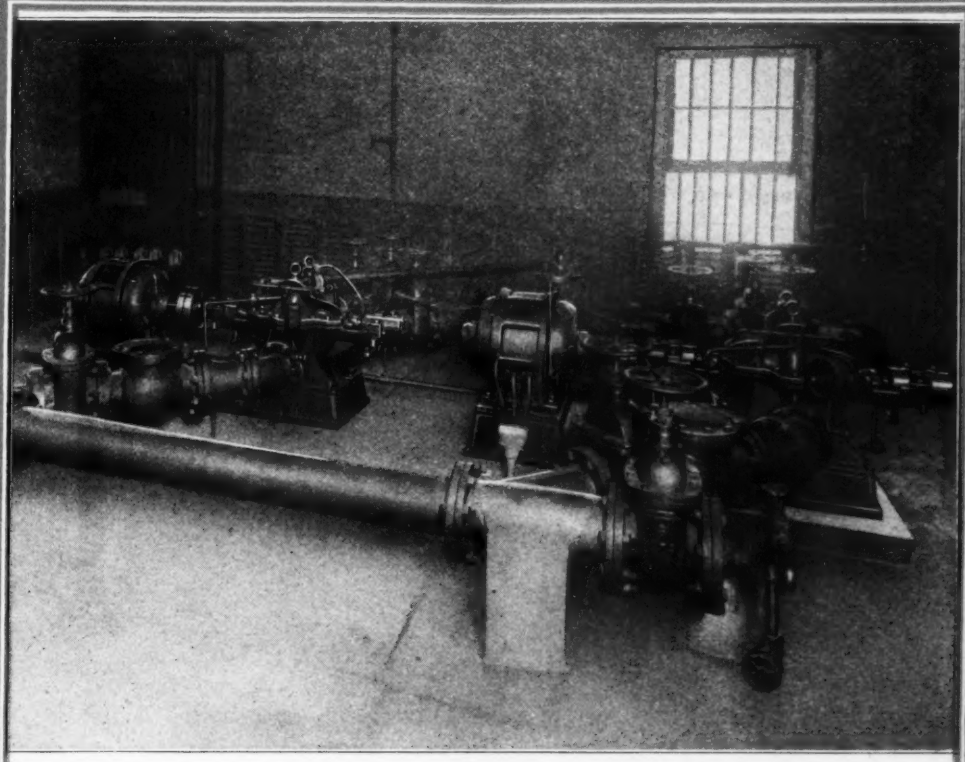




The Lundie Engineering Corporation
920 Broadway, New York
166 West Jackson Boulevard, Chicago

TIE PLATE

AMERICAN
AURORA, ILL.



"American" Pumps in a Typical Railway Pumping Station

THE pumping station pictured above, of the Illinois Central Railway, is typical of the automatically controlled station—only one man is required as attendant.

The water for the three locomotive supply tanks which this station supplies, is pumped from the Kankakee River by two 5-inch "American" centrifugals directly connected to 25 hp., 1800 r.p.m., G. E. Motors, automatically regulated by the Sundh control panel.

Data on the savings and cost per thousand gallons of water pumped, as well as figures on labor saved, will interest you. We'd like to send you comparative costs—ask us for them.

GENERAL OFFICES and WORKS - AURORA, ILL. CHICAGO OFFICE - FIRST NATIONAL BANK BLDG.

THE AMERICAN WELL WORKS

THE "American" S.I. pump is a horizontal, split shell, 2-stage pump, furnished with bronze enclosed impellers, labyrinth bronze wearing rings, bronze shaft sleeves, and bronze split glands. The pump has ring oiling bearings with a ball thrust on the outboard bearing to take care of any unbalanced thrust which may occur.

This pump is designed with opposed impellers, which take care of end thrust. The impellers are single suction type, and are hand filed and properly designed to give the highest efficiency possible. The pump is provided with a flexible coupling of the pin and bushing type to connect to prime mover.

The bearings of the pump are entirely separate from the stuffing boxes which eliminates the possibility of grit in the bearings. However, the reservoirs are large, furnishing a liberal supply of oil. The stuffing boxes are water sealed, so as to insure tight packing without excessive pressure or friction on the revolving shaft.

This pump is furnished in sizes from 1¼" to 10", capacities up to 4000 g.p.m., and total heads of 500′ on the larger sizes and capacities.

Write for catalogue to the nearest office.

DISTRICT SALES AGENCIES:

New York City (Domestic and Export)
Philadelphia, Pa.
Pittsburgh, Pa.
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Detroit, Mich.
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GENERAL OFFICES and WORKS – AURORA, ILL. CHICAGO OFFICE – FIRST NATIONAL BANK BLDG.

THE AMERICAN WELL WORKS

A Necessity
Not a Luxury—

NOW USED BY MANY LEADING RAILROADS
BECAUSE IT—

Throws Without Lifting.
Clears a Passing Train.
Makes Track Lining Easy.
Requires Only One Seating. Releases Men for Other Work. Is Used in Any Kind of Ballast. Does With One Man the Work of Four Men With Bars. Concentrates Force for Lining Kinks, Switches, Etc. Enables Each Section Gang to Keep Its Own Track Lined.

The Rail Joint Company
61 Broadway New York

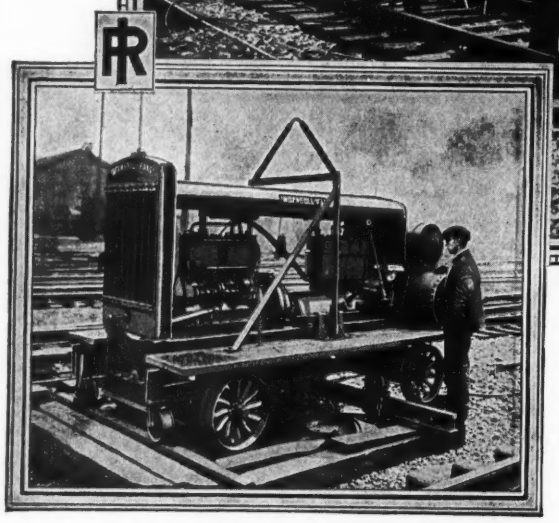
"RAJO"

Releases two men out of five for other work

Simplifies work of lining track

"RAJO" TRACK LINER

Twelve pneumatic tie tampers operated from a tie tamper air compressor



Some of the air tools operated from a tie tamper compressor

Labor Aiding Compressed Air Tools

A pneumatic tie tamping outfit and air tools make it possible to save labor and speed up the work on dozens of operations.

The pneumatic tampers enable each man to tamp three to four times as much track per day as by hand methods and to do a much better job. They make a big saving of labor

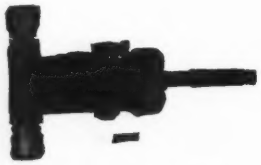
Other air tools and devices such as sand blast and paint sprays, grinders, pneumatic wrenches, rail bonding drills, rail drills, riveting hammers, etc., can be used with tie tamper compressors further increasing the labor savings. Ask for complete information.

Pneumatic Tie Tamper

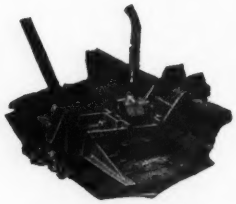
Portable Pneumatic Grinder

Sand Blaster Paint Spray

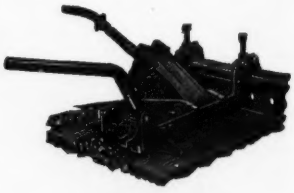
INGERSOLL-RAND COMPANY
11 BROADWAY NEW YORK CITY
Offices in principal cities the world over.
For Canada Refer—Canadian Ingersoll-Rand Co., Limited,
260 St. James Street, Montreal, Quebec.



Pneumatic Wrench



Bail Banding Drill
Drills up to 9/16″ die



No. 9 Rail Drill
Drill 9/16″ and larger

Ingersoll-Rand

facts and comments! by Casey Jones

LIGHT WEIGHT but SAFETY FIRST always

Safety First is the most important factor in an Inspection Car. This car is light enough for one man to handle and is strong and powerful enough for four men. The frame is constructed of light channel iron, the axles are special axle steel and 1¼ in. diameter. Strength is predominant in the construction of the Casey Jones 531 Safety First Inspection Car. Weight 500 lbs.

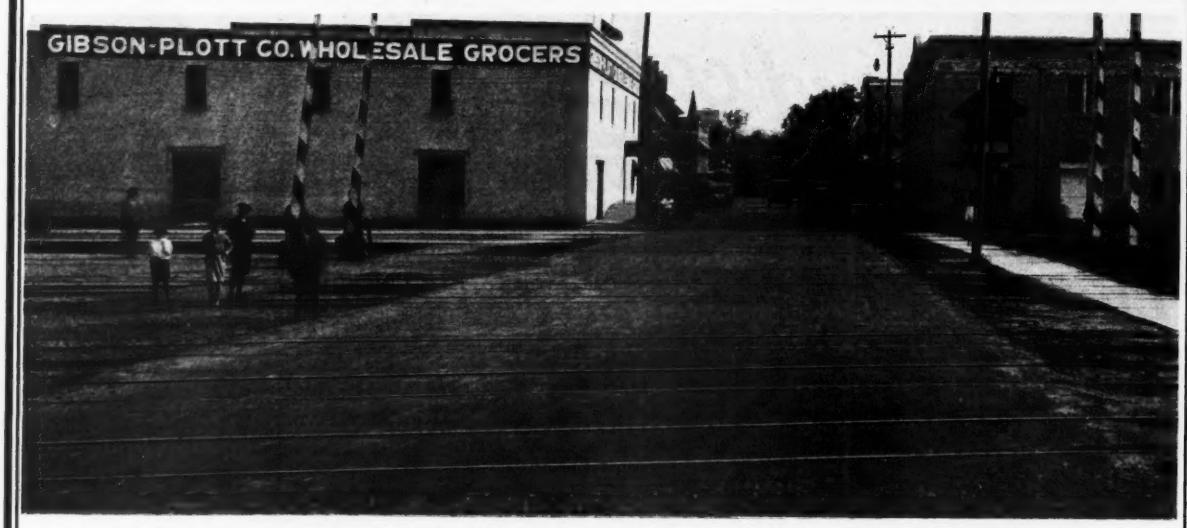
Specify Casey Jones An investment in permanent satisfaction

Convenient lift handles and safety railings on both ends of the car, a spring suspended seat which eliminates rail joint jolt and convenient control levers are outstanding features. A 4 H. P. Casey Jones Ball Bearing Engine of the free running, belt driven, water cooled type supplies sufficient power to drive the car with plenty of reserve power for extreme conditions.

NORTHWESTERN MOTOR COMPANY, Eau Claire, Wis., U. S. A.

Casey Jones REG U.S. PAT. OFF.

MANUFACTURERS RAILWAY AND MOTOR CAR EQUIPMENT



Florida Ave., crossing A. C. L. Ry., Lakeland, Fla. Two and one-half years without maintenance. Traffic 6000 vehicles a day.

Kyrock Means Better Crossings, Longer Life, Less Labor, Lower Cost

Kyrock has met the demand for a long lived pavement that is simple to construct and maintain at a comparatively low cost. The best proof of its merit is the fact that Kyrock has been adopted by many leading railroads and, to our knowledge, no railroad which has once adopted Kyrock has ever reverted to any other material.

Simple to Construct

Kyrock is shipped in open top cars ready to lay. It is not damaged by the elements in transit and may be stored in the open even for a period of years. Kyrock is laid cold on any standard base. It is spread on the foundation, raked and tamped, and immediately opened to traffic. Section crews with tamps, rakes and shovels can maintain and construct Kyrock pavements. No special equipment or expert labor required.

Easy to Maintain

No other type of pavement is as easy to maintain as Kyrock. When necessary to cut the Kyrock pavement for track repairs, the surface may be restored by filling the hole with Kyrock and tamping. The patch will bond to the surrounding surface and under normal traffic will iron out until it can not be distinguished. There is no mixing. There is no waste of material as it may be stored at points along the line and used as needed.

Resists Wear and Vibration

Kyrock is less susceptible to damage from vibration than any bituminous pavement. Vibration cracks and other breaks quickly heal under normal traffic. Kyrock does not lose its life because it is a natural product and because it is not subject to damage in mixing or heating. Often the old Kyrock surface may be broken up and used for making a patch.

Kyrock gives a smooth black surface, the same in appearance as sheet asphalt. It is a perfect waterproofing and insulation for the base and track construction. It is the nearest non-skid of any high type pavement.

Platforms, Floors, and Runways

Kyrock is extensively used for station platforms, shop floors and runways. It is easy to lay and maintain. It is resilient and non-glaring. It is also an ideal patching and re-surfacing material for brick and concrete surfaces.

Our engineering department has prepared specifications and cross sections for various railway constructions. We have also issued a book on the use of Kyrock for railway construction and maintenance. Write for Booklet R R 2.

Kentucky Rock Asphalt Company

Incorporated

Marion E. Taylor Bldg. **Louisville, Ky.**

Insist on Kyrock, the Uniform and Standard Kentucky Rock Asphalt

Investigate!

The Ultimate Track Jack

YOU know the track jacks you are now using—their good points and their limitations. You know that rails and tracks have steadily been getting heavier, but in spite of this tendency you have hesitated to change an old standard tool for a new untried tool. Yet you clearly recognize the need for a new standard track jack of greater capacity and easier operation, made expressly to keep pace with the increasing weight of rail and track material.

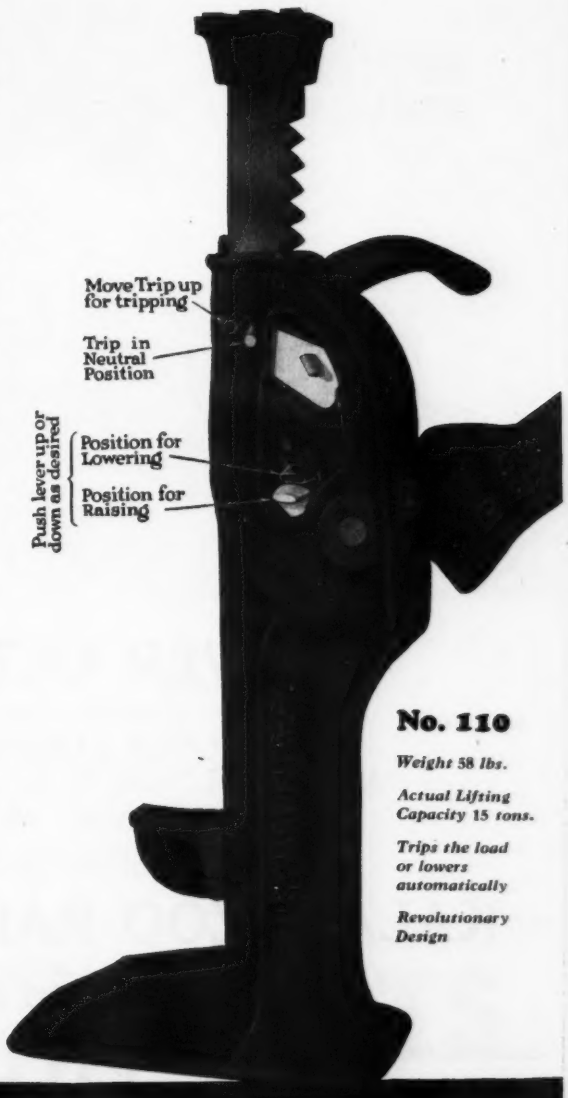
Now, since the perfection of the new Barrett track jacks No. 1-A and 110, the problem has been solved in the most successful manner. After six month's practical service test on one railroad, the officials pronounce them "by far the most satisfactory track jacks we have ever used." No railroad man who has yet thoroughly examined and tested these jacks, has hesitated to say they are the best he has ever used. Their great capacity, their easy operation, their particularly easy tripping, their simple automatic lowering device, their non-breakable trip, and other special new features, all combine to set these jacks apart as "the track jacks you will ultimately use."

Write us now for free test and full particulars

THE DUFF MANUFACTURING CO.

Established 1883 · PITTSBURGH, PA.

New York Chicago Houston
Atlanta St. Louis San Francisco


Move Trip up for tripping
Trip in Neutral Position
Push lever up or down as desired
Position for Lowering
Position for Raising

No. 110

Weight 58 *lbs.*

Actual Lifting Capacity 15 *tons.*

Trips the load or lowers automatically

Revolutionary Design

Genuine Barrett

Ask for FREE *Demonstration without obligation on your part*

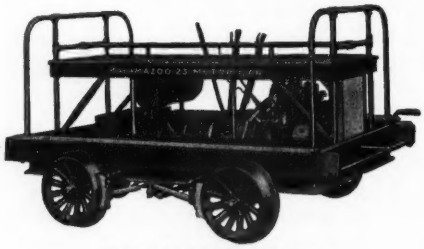
KALAMAZOO

MOTOR CARS

KALAMAZOO NO. 16
For Supervisors, Roadmasters, Signalmen and Linemen.

KALAMAZOO NO. 16-L
A light car for Inspection Service.

BETTER SERVICE



LOWER UPKEEP

KALAMAZOO NO. 23
For Heavy Section Work.

KALAMAZOO NO. 17
For ordinary Section Gang use.

KALAMAZOO NO. 25
For 12 to 24 men, Extra Gang Service and Construction Operation.

LOWER ULTIMATE COST

SEE OUR COMPLETE LINE AT THE
NATIONAL RAILWAY APPLIANCE EXHIBITION
CHICAGO, MARCH 9-12, INC.

SPACES 23-24-25-8-8½

KALAMAZOO RAILWAY SUPPLY CO.

MANUFACTURERS

KALAMAZOO, MICHIGAN, U. S. A.

CABLE ADDRESS "VELOCIPEDE"

KALAMAZOO

WRITE FOR OUR CATALOGUE

ARMCO Culverts in Railway Service

No. 16 of a Series

Name of Railway: Inland-Empire Railroad.

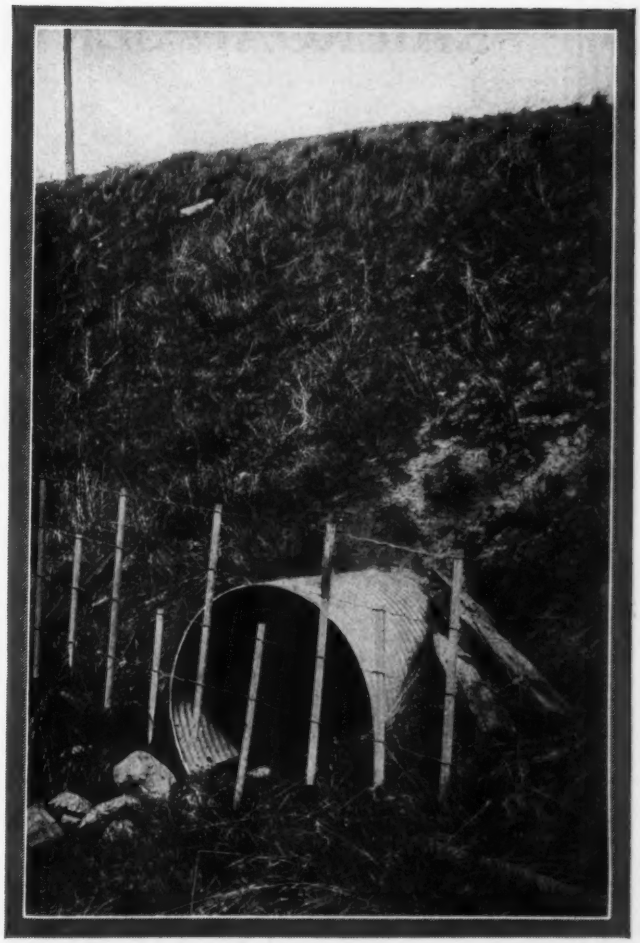
Location: Main Line, between Moscow, Idaho and Palouse, Wash.

Traffic: Average passenger and freight.

Installation Data: 60-inch, 14-gauge, ARMCO Culvert under fill of about 25 to 30 feet. Single longitudinal riveting—circumferential rivets on 15-inch to 18-inch centers. Length of culvert 70 to 80 feet. Installed 1907.

Condition: Perfect, except for slight sagging of culvert in center. Inspected and photographed May 8, 1923.

Remarks: This is one of hundreds of large size, light gauge ARMCO Culverts that are giving excellent service under deep fills and heavy traffic. Present installation requirements call for 10-gauge metal for such an installation.



There is a manufacturer in almost every state and in Canada, making Culverts, Flumes, Siphons, Tanks, Roofing, etc., of genuine, rust-resisting Armco Ingot Iron. Write for full information and nearest shipping point on products in which you are interested

ARMCO Ingot Iron

ARMCO CULVERT & FLUME MFRS. ASS'N, Middletown, Ohio

ARMCO CULVERTS

THE OXWELD RAILROAD SERVICE COMPANY

representing

THE LINDE AIR PRODUCTS CO.
(Linde Oxygen)

THE PREST-O-LITE CO., Inc.
(Prest-O-Lite Acetylene)

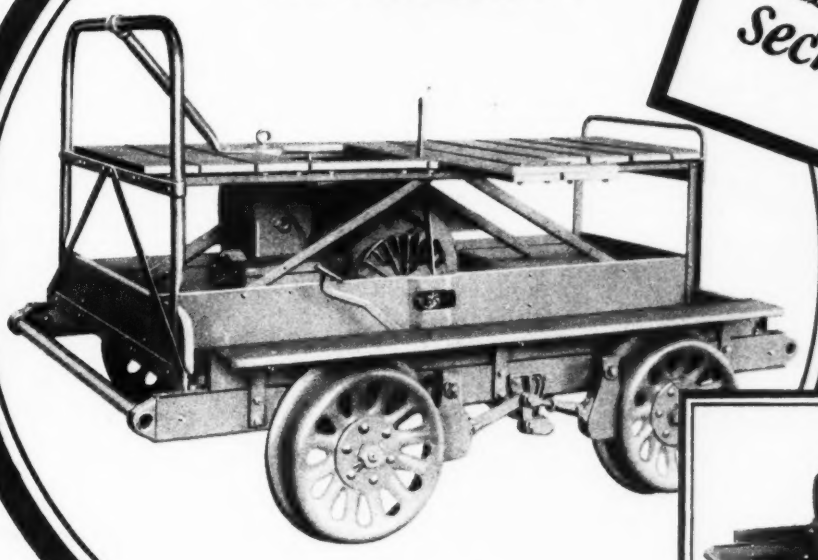
UNION CARBIDE SALES CO.
(Union Carbide)

OXWELD ACETYLENE CO.
(Oxweld Apparatus and Supplies)

Railway Exchange
Chicago

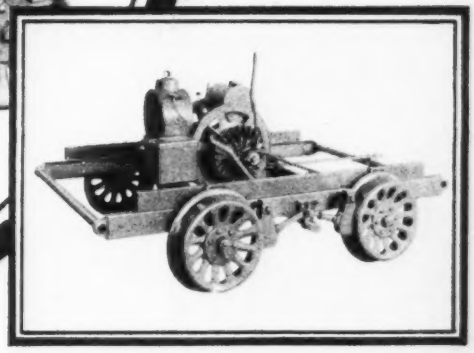
30 East 42d Street
New York

The Sheffield 44



ANNOUNCING
Two NEW
FAIRBANKS-MORSE
Section Cars

Take out four bolts and the body can be removed as shown here, giving free access to the engine and drive. Note the clutch construction.



New in every detail—

with an advanced drive that cuts running costs and maintenance

This latest Fairbanks-Morse Motor Car—the new 44—bases its claim for new economy not only on its more efficient and more accessible engine, but also on a perfected driving unit that delivers the full power at the wheels with easier manipulation.

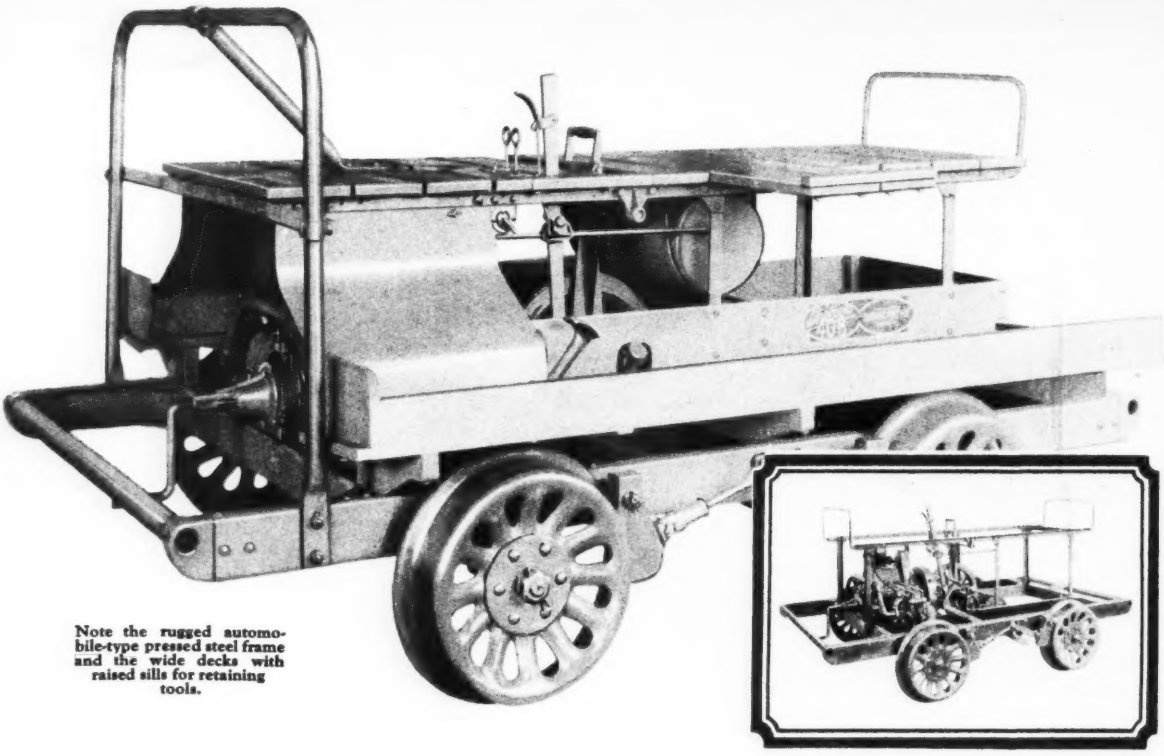
For the first time a clutch has been developed that *cannot* be burned out—a clutch that is simple and fool-proof. Large faces with cooling fins that dissipate the heat have made this a reality. And the result is a chain drive with perfect clutch control—a drive that eliminates the sliding engine base or belt tightener, and the strains on crankshaft and car that always go with belt drive.

In this one-cylinder, water-cooled car you'll find the features you've been waiting for—a fully accessible engine bolted tight to a pressed steel automobile-type frame; a high safety rail as standard equipment; light weight that reflects good design; above all, *full power at the wheels.*

Our representative will give you complete information covering this car or the new Sheffield 40-B, described on the next page. Bulletin information will be mailed on request.

FAIRBANKS-MORSE

MOTOR CARS



Note the rugged automobile-type pressed steel frame and the wide decks with raised sills for retaining tools.

Expect even greater economy from the new Sheffield 40-B

This reliable Fairbanks-Morse Two-Cylinder, Air-Cooled Motor Car supersedes the well-established Sheffield 40, retaining the good features that made the former model famous and adding refinements that will win still more friends.

The engine that has always been so well thought of is still further refined and now represents the sum-total of all that is best in automotive practice—three point suspension—crankshaft mounted on Timken Bearings—simplified friction transmission.

A new automobile-type pressed steel frame—undoubtedly the strongest that has ever been used on this type of car—takes the place of the former frame and insures absolute rigidity. Timken Taper Bearings on the axles absorb both thrust and radial loads and prevent the cutting of axles. The new decks are wider, providing more tool space.

Our representative would like to show you why you can expect even greater things from the Sheffield 40-B. Bulletin information will be mailed on request.

FAIRBANKS, MORSE & CO., Chicago
Manufacturers · Engines, Pumps and Electrical Machinery

FAIRBANKS-MORSE

MOTOR CARS

A-756-225-031M

RACOR

RAMAPO AJAX ELLIOT

SEVEN WORKS

HILLBURN, NEW YORK
NIAGARA FALLS, N. Y.
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PUEBLO, COLORADO
SUPERIOR, WISCONSIN
NIAGARA FALLS, CANADA

MANUFACTURERS OF

HEAVY DUTY HEAT TREATED
GUARD RAIL CLAMPS
DROP FORGED RAIL BRACES
ADJUSTABLE RAIL BRACES
DOUBLE SHOULDER ROLLED SWITCH PLATES
MANGANESE REINFORCED SWITCH POINTS
RAMAPO AUTOMATIC SAFETY SWITCH STANDS
AJAX MANGANESE ONE-PIECE GUARD RAILS
SWITCHES FROGS CROSSINGS
SPECIAL RAILWAY TRACK WORK IN
OPEN HEARTH STEEL,
CAST MANGANESE AND ROLLED
MANGANESE RAIL CONSTRUCTION

RACOR TRADE MARK

MAIN OFFICE HILLBURN, NEW YORK

Sales Offices at All Works—Also

30 CHURCH STREET, NEW YORK
McCORMICK BUILDING, CHICAGO

Ramapo Ajax Corporation

The Jordan Spreader

JORDAN SPREADER
"Does the Work of an Army of Men"
SNOW PLOW ICE CUTTER UNIVERSAL STANDARD DITCHER
O. F. JORDAN COMPANY
WALTER J. RILEY, PRESIDENT
EAST CHICAGO, INDIANA

JORDANIZED

THE PICTURE TELLS THE STORY

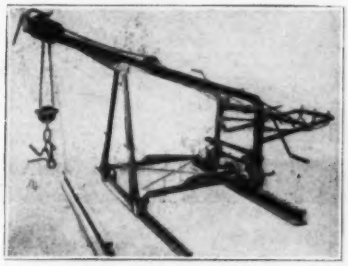
LABOR SAVING DEVICES

POWER BALLAST SCREEN SAVES LABOR AND BALLAST

THE THREE MEN RAIL LAYER

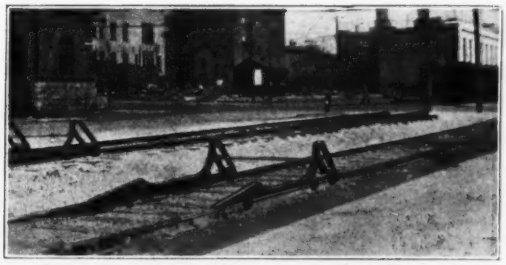
Saves labor and reduces the liability of accidents to a minimum.

In use on over **100** Railroads.



WOODINGS TRACK TOOLS

are carefully made of the best of steel for purposes intended by men who have spent their lives on this work.

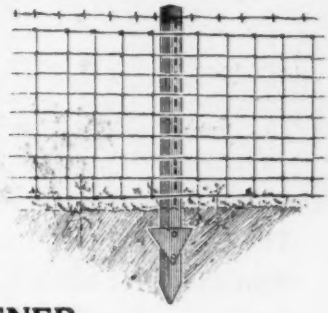


BREYLEY FRICTION CAR STOP

Saves replacing damaged bumping post.

RED TOP STEEL FENCE POST

Saves labor necessary to dig post holes and set cumbersome wooden posts.



THE WAGNER SWITCH POINT STRAIGHTENER SAVES SENDING BENT POINTS TO THE SHOP

BLAIR TIE SPACER

Saves ties and labor.

MAINTENANCE EQUIPMENT CO.

RAILWAY EXCHANGE CHICAGO, ILLINOIS

SEE OUR EXHIBIT AT THE COLISEUM—SPACES NO. 194-195

The Giant Track Liner

More Power Exerted in the Right Direction

Open Position

A Real

LABOR SAVER

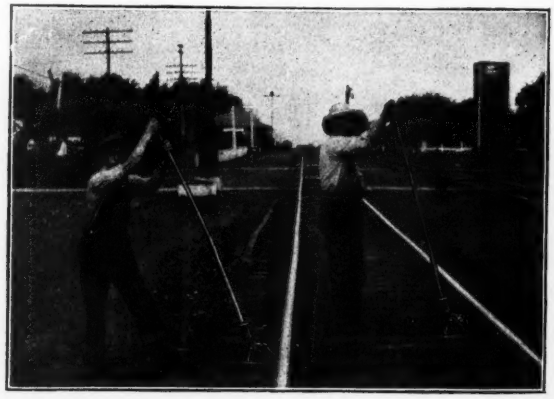
at the Ratio of

7 to 2

TWO men using GIANT Track Liners will line as much track as SEVEN men following the old method of using lining bars.

FOUR men using GIANT Track Liners will line a switch or crossover. FOURTEEN men or more, if available, are generally used by the old method.

7 to 2



The GIANT Track Liner is made of cast steel. Completely assembled, it weighs less than 35 lbs. It has a footing base of fifteen by six inches and can be easily carried on section handcars or motorcars.

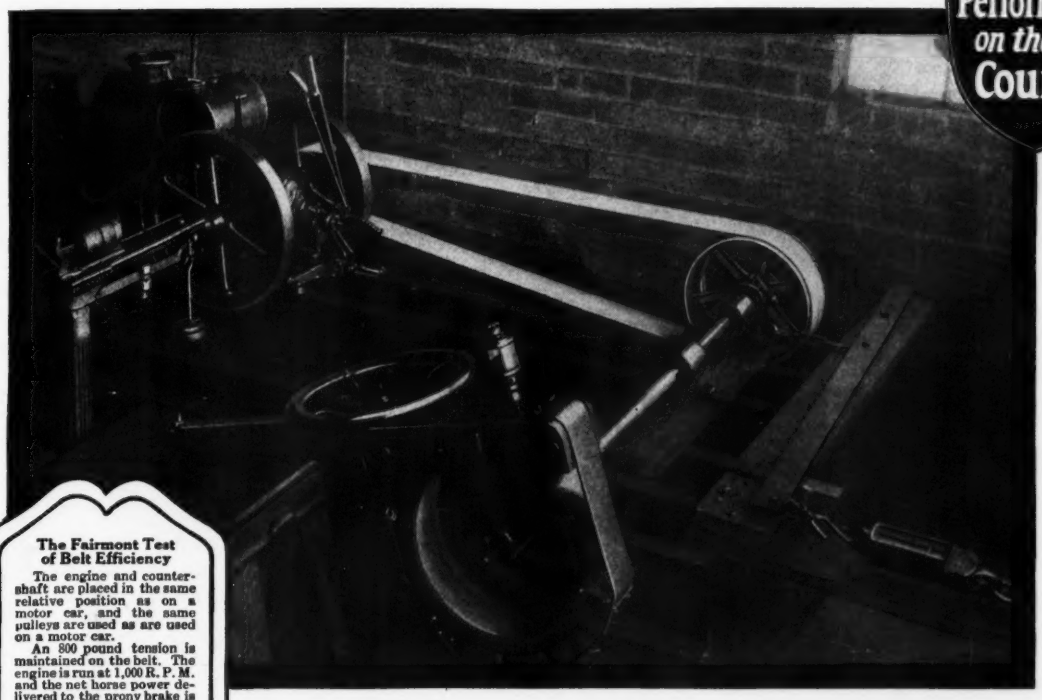
Manufactured and sold exclusively by

Gustin-Bacon Manufacturing Company

Kansas City Philadelphia

Write for further Information

Performance on the Job Counts



The Fairmont Test of Belt Efficiency

The engine and countershaft are placed in the same relative position as on a motor car, and the same pulleys are used as are used on a motor car.

An 800 pound tension is maintained on the belt. The engine is run at 1,000 R. P. M. and the net horse power delivered to the prony brake is 7 1-2 H. P. Through this test which duplicates the most severe working conditions the endless CORD belt used on Fairmont Motor Cars was developed. It has ample tensile strength for unusual strains and the wear-resistance that assures many years of dependable performance.

Belt Drive

Belt Driven Cars Predominate. Two well made pulleys (one on the engine shaft, the other on the car axle) plus an endless CORD belt form the simplest and most economical, most flexible and noiseless transmission known. FAIRMONT cars employ no idler pulley—Engine is mounted on a sliding base to tighten belt.

Influencing the Entire Industry!

ITEM after item in the mechanical construction of motor cars can be pointed out which first was used by Fairmont and later adopted by the industry generally.

The belt drive now accepted as the only practical form of power transmission for motor cars is the product of Fairmont's pioneering efforts.

Many of the improvements made in motor car belting during the past two years are also the result of Fairmont leadership in analyzing motor car requirements.

The testing set shown above designed by Fairmont has been particularly helpful to belt manufacturers and is directly responsible for the endless CORD construction of the belt used on Fairmont Motor Cars.

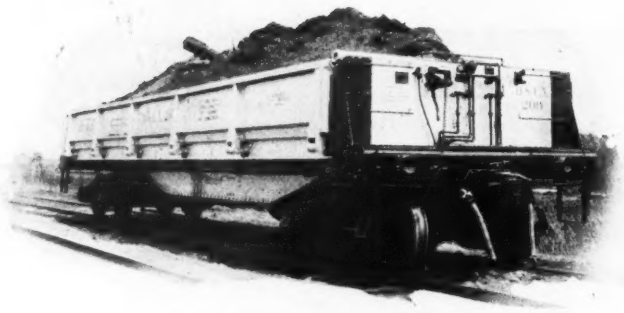
Forever forging ahead in the advancement of motor car efficiency, Fairmont continues to excel in the number of motor cars used by the leading railroads of the country.

FAIRMONT RAILWAY MOTORS, Inc.
Fairmont, Minnesota

DISTRICT SALES OFFICES:
New York Chicago St. Louis San Francisco Washington, D. C. Winnipeg, Canada

Fairmont

Ball Bearing Engines and Railway Motor Cars



All-steel, rugged construction

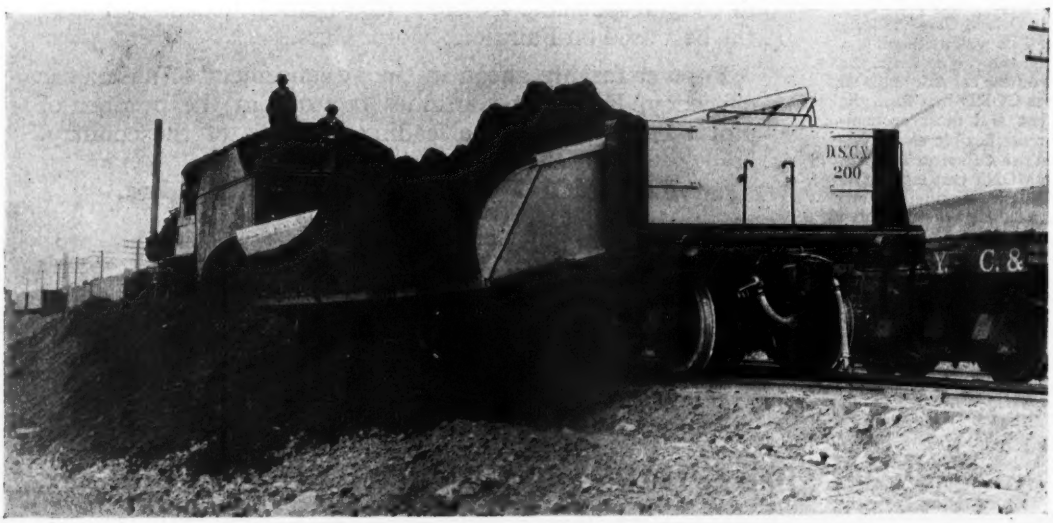
Keeps the ballast clean

DIFFERENTIAL
AIR DUMP CAR
THE ALL-ROUND DUMP CAR

It is lower (only 7'-0" from rail to top of sideboard).
It dumps its load well beyond the ends of the ties. Keeps ballast clean.
It dumps easily without shock or strain.
The body is under control throughout the dumping operation.
It dumps to either side by simply moving control lever in desired direction.
It dumps all classes of material from gumbo to huge boulders.

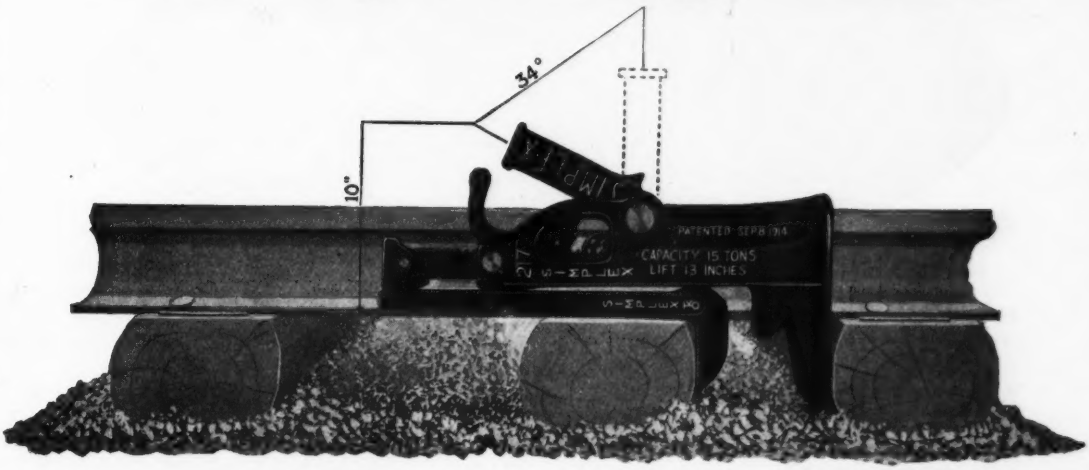
Complete information in Bulletin D-12.

THE DIFFERENTIAL STEEL CAR CO.
FINDLAY, OHIO

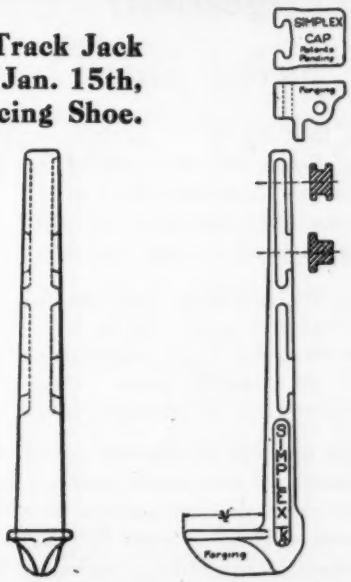


Material can be dumped in desired quantities. Body under control in all positions

Simplex
Tie Spacing Shoe



Illustrating the practical use of a Simplex Track Jack that is fitted with its new cap (standardized Jan. 15th, 1925) and the Simplex detachable Tie Spacing Shoe.



Demonstrating that with the application of the new caps to Simplex Jacks that are in service, that every Simplex Track Jack is a potential tie spacer.

Two of the Simplex detachable Tie Spacing Shoes are deemed sufficient for every section of track, provided that all of the jacks are equipped with the new caps.

Without danger of "humping the track" or "injury to the ties" you can now space any number of ties, by removing the ballast in front of the first tie only.

Templeton, Kenly & Co., Ltd.

1020 South Central Ave. **Established 1899** **Chicago, Ill., U. S. A.**

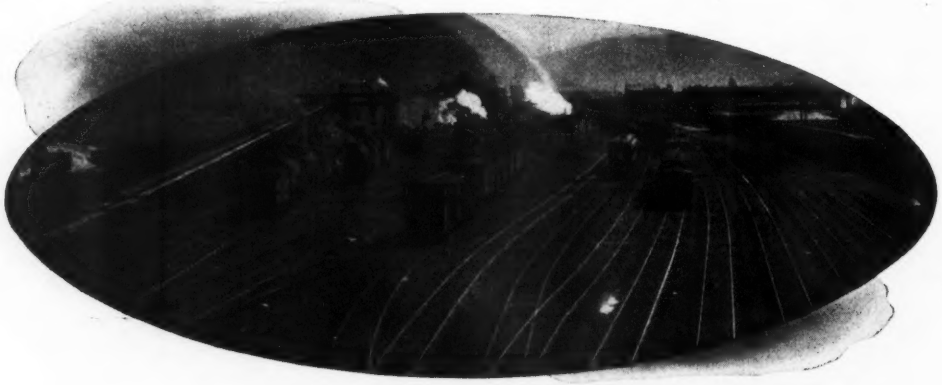
Philadelphia, Drexel Bldg.
Pittsburgh, Keenan Bldg.
St. Louis, Arcade Bldg.
St. Paul Merchants Bank Bldg.

Sole Manufacturers of the
Simplex Jacks
Sydney, 115 Pitt Street

San Francisco, 311 Minna St.
Toronto, 12 Sheppard St.
London, 2 Norfolk St.
Paris, 114 Faubourg Poissonniere

Represented by The Baldwin Locomotive Works in Argentine, Brazil, Colombia, Cuba, Jamaica, Panama, Porto Rico, Santo Domingo, Venezuela, and South Africa.

DURO

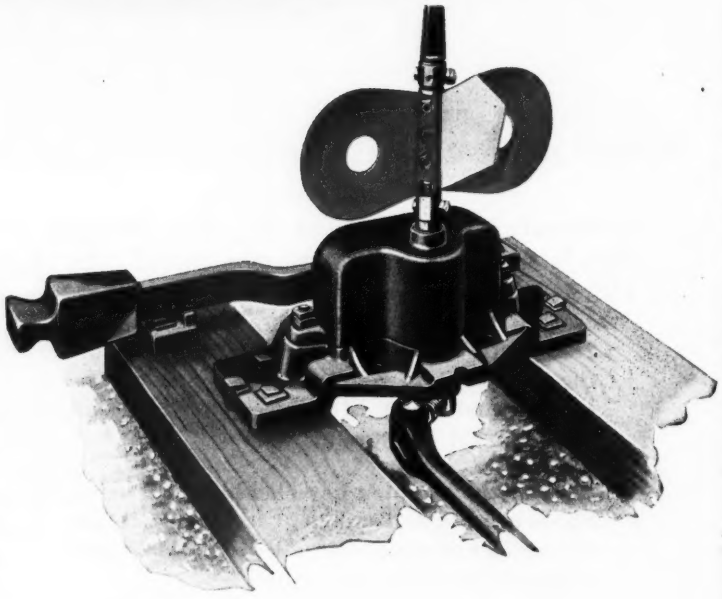


New

ANDERSON

(gearless)

Switch Stand



SIMPLICITY — Strength — Safety are so combined in the new Anderson Duro as to make the superiority of this switch stand at once apparent.

In the operating mechanism, cams and gears have been eliminated. Steel introduced for all wearable parts. Base Construction of malleable iron.

The element of absolute safety is an outstanding Duro feature. Lever crank position by design is past dead center so that no amount of pressure or vibration can cause a Duro to open the slightest degree—This is the reason Duro needs no latches on Yard Switches. Latches are furnished where padlocking is required.

It is unquestionably the one-switch stand.

Scientifically Built for Long Service

Manufactured by

The American Valve and Meter Co.

CINCINNATI, OHIO

Railway
Engineering and Maintenance

Volume 21 March, 1925 Number 3

TIME TO GET STARTED

IT IS NOW the time of the year when engineering and maintenance officers should have a fairly accurate knowledge of the amount and character of the work to be done during the summer and they should have their programs well in hand with the idea of undertaking work as soon as the weather permits. The indications are that while the volume of work to be done will be considerably larger than normal, there will be an adequate supply of labor, thereby continuing the condition which prevailed last year. This outlook should not, however, be permitted to lull any one into a false sense of security to the extent that he will permit the inauguration of his work to lag.

There is one safe way to proceed with a program. That is to take advantage of the first favorable opportunity to get the work under way and to prosecute it with diligence during the early months of the summer. This is also the economical way. It not only extends the working season and thereby conserves labor, but it makes the work more attractive to the better grade of men and they become more efficient owing to their longer period of employment. An early start on a season's campaign also permits of a more flexible program for with a large part of their work out of the way, the forces are in a position to undertake additional improvements which become necessary and are authorized later in the season. Those engineering and maintenance officers conduct their operations most efficiently who impress upon their managements the necessity for an early, orderly opening of the season's work and who anticipate this by proper arrangements for the establishment of their gangs and the distribution of their materials.

PRODUCTION AND WAGES

THE AVERAGE wage per hour of all railway employees in the United States is 160 per cent higher than it was in 1913. In the meantime, the average freight rate of the railways has been increased only 55 per cent and their average passenger rate only 48 per cent. The cost of living in the country is only 70 per cent higher than in 1913. Therefore, the railway employee can buy much more of the things he needs with an hour's wage than he could 12 years ago.

What has made it possible for the railways to stand an increase in wages so much greater than the increase in their rates? What has made it possible for railway employees to get increases in their wages so much greater than the increases that have occurred in the cost of living? Increased productive efficiency. That is the answer. What is increased productive efficiency? Principally, it is an increase in output per man. In the railroad business it is an increase in the number of tons carried one mile by the railways for every man employed. Without an increase in the amount of traffic handled greater than the increase in the number of men employed it would be impossible for the railways to increase wages more than the increase in their rates and the cost of living.

What makes it possible for the railways to increase the amount of traffic handled by them per employee? Principally, labor saving machinery. It is the motor car, the tie tamper, the rail laying machine, the ditcher, the track liner, etc., that make it posisble for the railways to do increased work on their tracks and structures without increasing the number of men employed and this in turn is what makes it possible for them to pay higher wages without increasing all of their operating expenses and rates in proportion. It is to the interest of maintenance of way men, whether engineers, maintenance of way, roadmasters or section foremen to make good use of all available labor saving machinery, for it is the thing that increases productive efficiency and productive efficiency is what makes it possible in the long run to increase salaries and wages more in proportion than the cost of living increases.

MORE ATTENTION TO BRIDGE WORK

IN A RECENT hearing before the labor board concerning a case involving the contracting of certain bridge maintenance, a railway officer offered arguments in justification of the contract that have an important bearing on the subject of labor saving methods and devices. It was pointed out that the methods used by the contractor differed entirely from those employed by the railway bridge maintenance forces and that he employed a large locomotive crane in his work. The inference drawn from this is that the contractor could do the work to better advantage and at less cost than it could be done by company forces because of the methods and equipment which he used. There is every reason to believe that the officer's contentions were sound in so far as his comparison is concerned. But what is not entirely clear is why this railroad and railroads in general cannot adopt the methods and acquire the equipment which this and other contractors employ in their work.

Progress has been and is being made in the application of improved methods and power tools and equipment in the work of maintaining track and structures. But in general, the improvement has been more marked regarding track work with respect to bridge operations. This observation may readily be confirmed by a review of the descriptions of new devices appearing elsewhere in this issue, nearly all of which relate to devices and equipment used in track work.

The same holds true of the several articles discussing the problems of employing labor saving equipment to the greatest advantage, the examples cited in these articles being such as are concerned primarily with track work, ditching, etc. What is the reason for this condition?

In studying the application of power equipment to bridge work it is necessary to divide the subject under three heads, since three distinctive types of structures are concerned, namely, steel, concrete and wood. With respect to the first class the foremost question is whether the repair work and the erection of minor structures commonly done by company forces justify the employment of the hoisting equipment and pneumatic tools commonly used by bridge erection contractors. This would appear to be a matter closely related to the policy of the railway as regards the extent to which this work is to be done by railway forces. Of greater importance with respect to the maintenance of steel bridges is the problem of painting. The railroads are now making extensive use of paint spraying equipment in their car shops and car repair yards but thus far little use is being made of such equipment on bridges or buildings. However, this would appear to offer one of the most fertile fields for the reduction of labor costs chargeable to bridge maintenance and a number of railroads are now actively engaged in investigations of the possibilities.

In concrete construction the railways have made commendable progress in the use of power equipment. Their work is distinctive in that the great bulk of it is in jobs of small yardage which do not justify the elaborate plants employed on building and highway construction. Here again as in the case of steel structures, we encounter the question of policy as to the relative merits of company or contract work.

By far the great bulk of bridge maintenance is encountered in connection with the repair and renewal of pile trestles and whereas the use of high-power and well appointed pile drivers is becoming increasingly common, little equipment is used today in the framing and erecting of trestle decks that was not in vogue 50 years ago. It must be said in justice to bridge maintenance officers that the problem imposed in the application of labor saving equipment to his work is exceedingly formidable. The use of erecting equipment introduces at once the question of the occupancy of the operated tracks which is not involved when the ordinary rough-and-ready methods are employed. Efforts to employ power tools are confronted with the need of a high degree of portability because the sizes of the timbers involved require that the tool must be carried to the sticks rather than the sticks to the tools.

In the face of these difficulties it is perhaps not surprising that little progress has been made. Another explanation may be had from the fact that the higher officers in the bridge department have their time largely occupied by problems relating to the design and construction of permanent bridges, particularly on those roads in the best position financially to engage in development work. However, the fact remains that the mileage of bridges on American railroads does now and will for many years continue to consist in large proportion of wooden bridges and trestles so that a large part of the labor employed for bridge maintenance is chargeable to work on such structures.

CHICKEN DINNERS

A short time ago a section foreman on a western road was appointed a member of the local committee to stimulate traffic for his road in his community. Desiring to justify the confidence thus placed in him by his superior officers, he set about to see what he could do to promote the interests of his road. No other railway served his locality so that there was no traffic which he could divert from a competitor. The motor truck and the motor bus had not yet invaded this territory so that there was no traffic to be taken away from them. He was hard pressed to make a showing. He discussed the problem at length with his wife and finally they developed a plan whereby she prepared an elaborate chicken dinner to which they invited a number of friends from a distant city. These friends accepted their hospitality and enjoyed a pleasant day, the railway profited to the extent of nearly $50 in passenger fares and the foreman's reputation was sustained. When employees take the welfare of their companies as seriously as this foreman, those companies cannot do other than prosper and when this prevails they are good roads to work for.

A MUTUALITY OF INTERESTS

IN AN ARTICLE entitled "Merit or Prejudice—Which?" appearing in a following page in this issue, a writer familiar with the problems confronting the manufacturer in introducing labor saving devices on the railways analyses the mental attitude of many railroad men when such devices are brought to their attention. In the preparation of this article the author disclaims any intention of being critical of destructive in his comments; rather he hopes that the results may be constructive. The instances which he cites are drawn from actual experience in the promotion of labor saving equipment on a large number of prominent railways and the men to whom he refers are in active and responsible charge of large transportation systems today.

In the preparation of this article the author does not overlook the fact that for every instance that a railway has pursued a short-sighted policy in this buying, an equally pronounced case of poor selling can be cited. He has confined his attention to the shortcomings of railway officers solely because *Railway Engineering and Maintenance* circulates most largely among them. Furthermore, he is influenced by the fact that regardless of the amount of the profit that accrues to the manufacturer, if the device is properly termed a labor saving device, the major earnings accrue to the railway and any undue delay on its part in adopting the device results primarily in its own loss. He believes that the officers of a road owe a duty to their stockholders to spend their money carefully, but that they also owe these stockholders a duty to investigate sympathetically any device that offers promise of reducing expenses of operation, to co-operate where necessary in its development to the exeent that the practical experience and facilities of a railway organization are required and to make the expenditures necessary for its purchase when its economy is demonstrated. In brief, he believes that the relation between a manufacturer of a worthwhile labor saving device and a railway officer in a position to profit by the use of this device should not be fundamentally antagonistic, but rather that of men engaged in a work of mutual benefit.

During 1923, the last year for which complete statistics are available, the railways of the United States purchased equipment and supplies other than fuel amounting to $2,180,000,000. These materials comprised a wide diversity of products. Their purchase brought thousands of manufacturers into negotiation with engineering, mechanical and purchasing officers of the railways and lead to millions of transactions. In these negotiations many poor or penny-wise decisions were made by railway officers, while an equal number of errors were made by the manufacturers in the promotion of their products. By calling attention to some of the shortcomings of railway officers, as he sees them, the author of the article referred to has endeavored to present a picture which may cause railway officers to review their own attitude to the end that the merits of labor saving equipment may be considered not primarily from the standpoint of the objections and obstacles imposed by its introduction, but more largely with a view to the potential savings which will result to the railways from its more extensive use.

CENTRALIZE THE CONTROL OF WORK EQUIPMENT

WHAT MAY be considered the most distinctive feature of the present issue of the annual labor saving number of *Railway Engineering and Maintenance* is the attention given to the organization and supervision of work done with power equipment. This is evidence of a growing recognition of the fact that a large investment in work equipment not only justifies but demands systematic control of the distribution and use of the equipment and its maintenance and the recording and study of the performance obtained with it.

In general such control must be exercised on a system basis, even though the maintenance of way work is handled by a strictly divisional organization. The reason for this is plain. Much of the larger equipment is of a type such that each division cannot be expected to provide sufficient work to keep a single unit employed continuously, notwithstanding the fact that there may be times when more than one unit can be used profitably. This means that the number of machines purchased by the railroads is generally less than the number of divisions, thus requiring that the machines be transferred from one division to another during the course of the active working season. To the end that the machines will be distributed equitably among the various divisions in proper relation to the amount of work to be done and to provide adequate operating force, as well as for the repair and care of the equipment during the active and idle seasons, centralized control is necessary.

But the need of centralized supervision has an even broader aspect. From the standpoint of the division maintenance of way officer the employment of power equipment is a means to an end. It is but an incident in his multifarious responsibilities which are and must always be primarily those relating to the adequate upkeep of the tracks and structures under his supervision. Unless he has a particular bent in the direction of mechanical matters he cannot be expected to acquire a detailed knowledge of the operation and maintenance of the highly specialized machines. There is, therefore, a definite need for the specialist competent to supervise the training of men employed to operate and care for the machine who can, therefore, insure that the machines are used to the best advantage and kept in proper condition. A man with the necessary qualifications for such a position, calling particularly for experience in maintenance of way work and a knowledge of machinery and who is active-minded and resourceful can readily pay his salary many times over in the better output of the equipment.

THE LABOR SAVING ISSUE

RAILWAY *Engineering and Maintenance* believes in the more extended use of mechanical equipment for the many operations involved in the construction and maintenance of railway tracks, bridges, buildings and other structures. It has given much space to the description of new developments in labor saving equipment and to the problems arising in the utilization and maintenance of this equipment. It believes that by so doing it is promoting the interests of the railways and furthering the economical conduct of those operations confronting the engineering and maintenance officers.

The Labor Saving issue has become an established institution. It is designed to focus attention on the progress which has already been made and to emphasize the possibilities for further improvements.

The current issue has been developed with that thought in mind. It opens with a resume of the outlook for an adequate supply of labor, presented by engineers in charge of maintenance on prominent railways in widely separated portions of the country. The labor which is available locally on the various railways must be supplemented in many instances by that recruited in the larger centers and since this labor supply is affected by immigration, the effect of the recent legislation, which had for its purpose the restriction of immigration, is being watched with interest by many railways. Data showing the extent to which this immigration has been restricted are presented in this issue.

When the railways make expenditures for labor saving equipment they have a right to expect a return from this equipment and unless executive officers can be convinced that this return can be secured, they are properly reluctant to spend any money for it. The article by C. A. Morse, chief engineer of the Chicago, Rock Island & Pacific, points out some of the returns which a railway has a right to expect from investments of this character.

Having purchased labor saving equipment the problem devolves upon engineering and maintenance officers to secure the maximum output of work from it. Three articles describing the methods pursued on the Erie, the St. Paul and the Rock Island to secure this production should be helpful to other railways confronted with the same problem.

A particularly important feature of this issue and one which has grown rapidly in recent years is the descriptions of new devices which have been developed to meet the need for more efficient and intensive mechanical equipment to reduce the burden on men and decrease the number required. In this section of the paper, which appears under the heading, "Getting the Manufacturers' Help," there appear descriptions of more than 15 devices which have been developed within recent months.

Supplementing the editorial pages are the advertising pages in which are presented more devices of a labor saving character than were ever before included within the covers of one railway publication.

Adequate Supply of Labor in Sight

Reports From Different Parts of the Country Indicate Active Season and Increasing Use of Mechanical Equipment

IN ORDER that our readers may have accurate information regarding the amount of work which is in prospect for this year, the supply and character of labor available and the extent to which the demand for labor will be offset by the increased use of mechanical equipment, we present reports which have been given us by engineers on prominent railways, selected because of their ability to provide information representative of the entire country. These letters confirm the forecast in the January issue to the effect that the amount of work on the program for 1925 will be equal to or in excess of that of 1924, which in turn was only slightly below that of 1923 in the magnitude of expenditures and exceeded it in the amount of work completed. The activity will be relatively uniform throughout the country. With the possible exception of a few of the more active industrial centers the indications also point to an adequate supply of labor to meet all requirements.

A noticeable feature of these letters is the uniform report of increasing efficiency of labor which characterized 1924 and which is expected to continue throughout this year. Supplementing this is the uniform recognition of the value of mechanical equipment in improving the quality of work and reducing the number of men required. The increasing use of this equipment is the natural outgrowth of the reduction in the hours of labor and the marked increase in wage rates during the last few years and is a development which may be expected to proceed with increasing rapidity in the future. With the increasing use of labor saving equipment there is a growing recognition of the fact that this equipment must be made to earn a return if its further application is to be warranted.

Reports from the various sections of the country are abstracted below:

Increasing Stability in Forces in South

By L. H. Bond

Engineer Maintenance of Way, Illinois Central, Chicago

We are planning on the usual amount of maintenance work during the current year and the present outlook for an adequate labor supply in 1925 appears to be favorable. It has been our observation that there was a considerable improvement in the efficiency and stability of labor last year as compared with the several years preceding. The labor which we commonly employ in the north consists mostly of Italians, Greeks, Mexicans and Negroes in the larger towns and in the extra gangs, while on the outlying sections there is a considerable amount of native white American labor. In the south, except on the Kentucky division, where considerable native white labor is available, we use colored labor almost entirely. The character of our labor is changing to the extent that during the past several years we have been obliged to bring in colored and Mexican labor on account of a scarcity of white and foreign labor in northern sections.

It has been the practice of this company to adopt the use of labor-saving equipment wherever conditions are such as to justify it, and it is our observation that other lines are following this same practice. The adoption of these mechanical and labor-saving devices has been fairly rapid in the past few years and, in my opinion, this will continue to an even greater extent in the future due to the higher wage rates prevailing for labor and the scarcity which develops every year in certain territories and often becomes general.

No Shortage of Labor Evident in East

By Earl Stimson

Chief Engineer Maintenance, Baltimore & Ohio, Baltimore, Md.

We have no large amount of construction work in prospect for 1925 and our maintenance program is about the same as it was in 1924, which we consider normal. The amount of work now programmed for the year is

In general, the character of labor composing our about the same as was done in 1924. The force required, therefore, will be about the same as last year.

In 1924 we had an ample supply of very good labor, over 90 per cent of which was native labor, recruited locally. The remaining 10 per cent was of the itinerant type, housed in boarding camps and needed in the industrial districts. Excepting this 10 per cent, the force was remarkably stable and efficient, and even the turnover of the itinerant labor was much less than in other years. Last year we were helped out in the mining regions, where generally good labor is scarce, by the marked curtailment in the coal mining industry. The

miner is an excellent worker and when the mines are closed down many seek employment on the track and give good service.

normal force has not changed in recent years. The extra force required to meet the peak demands, which occur at times when everybody is meeting the same situation, and which creates the labor shortages, has changed materially in character. The efficient Italian, Greek and Austrian extra gangs have been replaced by the much less efficient itinerant worker and the Mexican.

It is quite evident that mechanical, or so-called labor saving equipment is coming rapidly into extensive use in maintenance work. This is evidenced by the already wide and constantly extending use of the steam ditcher, locomotive crane, power drills and wrenches, ballast cleaning machines, tie tampers, paint sprayers and other machines already making up the long list. These machines do not so much overcome the inefficiency of labor, as it requires efficient handling to obtain returns from them, as they reduce the man hours required to do the work, making a direct and a readily apparent saving in costs. The use of these machines will help us largely to get by the next acute labor shortage.

While it is uncertain business to prophesy, I feel confident that on our road we will not experience an acute labor shortage during the coming season, but that with the exception possibly of the mill districts, we will have an adequate supply of good labor to carry out our construction and maintenance programs as now outlined.

Indications Point to a Busy Season

By Hadley Baldwin

Chief Engineer, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, Ohio

The efficiency and stability of labor during last year was relatively higher than at any time since the disturbance incidental to the war and federal control.

As we are hoping for improved earnings during this year, we anticipate somewhat heavier labor requirements for our maintenance program, but with regard to that alone I expect conditions to be practically no less satisfactory than last year. The character of labor commonly employed in our maintenance work is local, native labor, excepting the large gangs employed in reballasting and rail laying which, in part, have to be recruited through agencies employing men in the metropolitan centers where floating forces congregate seeking such employment.

During the past year, in which we carried on less new construction work than we may fairly expect to undertake this year, we had no difficulty whatever in securing adequate forces for such work. What the situation will be this year with regard to this part of our labor supply depends upon the volume of new work launched by the railroad companies in the aggregate. It has not been determined how much work will be authorized on our line and this is undoubtedly true on most of the lines, but if the demands for the amount of work undertaken by the railroads throughout the country greatly exceed those of last year it is likely that there will be difficulty in obtaining forces adequate to secure the desired progress on such work.

Pertinent to this contingency, it would seem to be advisable for the railways to get their new work launched as early as possible. If there is a limited force in the country we will accomplish more work during the year by getting the reserve forces at work now than by starting after one, two or three months of the working season have gone.

The employment of mechanical equipment in substitution for manual labor should be resorted to the greatest degree consistent with efficient and economical performance of the work. In the event of a labor shortage the use of mechanical equipment, where applicable, may become necessary or advisable, even though resulting in less economy than might otherwise be achieved with a plentiful labor supply. We are examining with much interest all mechanical labor saving devices that are being promoted, with the purpose of indulging in the use of such as seem likely to serve our requirements.

Labor Saving Equipment Must Come

By R. B. Robinson

Engineer Maintenance of Way, Union Pacific, Omaha, Nebr.

There is an air of optimism regarding business prospects in general throughout our territory, but on this date (February 8) there does not yet seem to be any definitely marked outline of activity. There is some highway work going on and a great deal planned together with a large amount of municipal work. Also, there is the usual yearly amount of railroad work to be done.

In our closely settled districts, there will probably be sufficient local labor to take care of our repair work requirements in these districts, but in our sparsely settled districts, our summer repair work will require us to bring in labor from other districts. This is also true of any large new work which may be authorized in either our closely settled or sparsely settled territory. During 1924 conditions were such that laborers could be given fairly steady employment at fair wages, and there was a consequent improvement in efficiency and very much less roaming about.

Toilsome, heavy work, which can be done as well or better by machinery than by hand, is being done mechanically more and more, both for reasons of economy as well as to conserve human energy for such work as requires human intelligence. The day of dogged, plugging, hammering away in an unthinking manner by men who have little thought except to get on the payroll and do as little as they can get away with, is happily passing on the railroad, and all classes of labor seem to realize that they can make more for themselves by using mind as well as muscle in their work.

Supply Affected by Agricultural Conditions

By H. M. Lull

Chief Engineer, Southern Pacific Lines, Houston, Tex.

It is very difficult at this time of the year to forecast conditions affecting labor supply in this territory during the summer months. Our lines traverse Texas and Southern Louisiana, in which territory agriculture is the predominant occupation. The labor supply is affected greatly by weather and crop conditions.

We seldom have any trouble in securing an adequate supply of white employees for our bridge and building forces. On track maintenance, negroes are employed principally in Louisiana and Mexicans in Texas. During 1924 there was no shortage of labor, except during two or three months in the fall during the cotton and sugar cane harvest. This condition may be expected each year.

There has been a tendency during the past three or four years for Mexican laborers to move north during the summer months, principally into the sugar-beet territory, and this affects the supply of labor in Texas to some extent. The movement of Mexicans into the United States along the Texas Border has also decreased to some extent, principally owing to the head tax now imposed. These conditions may create some labor shortage this year, especially if Texas crops should be good,

thereby increasing the demand for labor on the farms.

Labor saving machinery is being introduced to some extent in this territory, both on the railroads and on the farms. Such equipment as ditchers, spreaders, air dump cars, rail laying machines and the use of chemical weed killers and weed burners has reduced the amount of labor required for some purposes. On the other hand, increased traffic, the use of heavier equipment and faster train schedules make necessary a higher standard of maintenance and make it difficult to decrease the number of track men.

Improvement and maintenance work, such as rail renewals, ballasting and the construction of additional facilities on these lines, will probably correspond closely to the average of the past three or four years in amount.

No Shortage in Prospect in Middle West

By Engineer Maintenance of Way, Central Western Road

During 1924 the labor supply for maintenance and construction was generally what might be termed easy, this is to say, with few exceptions we were able to secure an ample supply of labor locally and at the labor centers. During the latter part of the year it looked as though we would be confronted with a labor shortage in 1925, but the situation has changed materially since that time.

The question of labor supply depends almost entirely on the volume of industrial work undertaken. At this time many industries seem to be marking time and the volume of industrial work, new construction, contracting, etc., is extremely indefinite. If I were to make a guess at this time it would be that the labor supply in 1925 will be about the same as in 1924.

Labor More Stable on Pacific Coast

By W. H. Kirkbride

Engineer of Maintenance of Way and Structures, Southern Pacific, San Francisco, Cal.

At present we are having no difficulty in securing a plentiful supply of good, efficient labor with comparatively little turnover. This condition shows every indication of continuing during the coming spring and summer, although during that time there will perhaps be more than the usual amount of work on the highways in California and in the farms and orchards of the coast, which may draw somewhat from our forces. Our labor is now showing greater stability and efficiency than at any time since the war.

In addition to our usual maintenance work, we are continuing the building of new trackage in Southern Oregon, and new second track on the Sierra Nevada mountains in California; and are engaged in large construction in Arizona. In carrying out this work we are utilizing labor saving equipment, and are strongly in favor of it. I consider that such labor saving devices aid immensely in carrying out our work. There is no doubt but that the use of this class of machinery, tools and devices not only makes up to a considerable extent for the shortage of labor in times when it is difficult to secure help, but it also tends, when labor is plentiful, to secure and keep competent men in the service. These devices also produce better results with less expenditure of man hours. I consider that money paid for such equipment is well spent.

Railroads Abandoned—During the month petitions were presented by various railroads for authority to abandon a total of over 50 miles of line, including a 25-mile line from Eagle Mills, Ark., to Princeton.

New Immigration Law Reduces Labor Supply

Comparatively little addition to the labor supply of the classes available for track work is to be expected this year as a result of immigration. A further marked decrease in the number of immigrants to the United States from the countries from which track laborers have come in the past is resulting from the changes in restrictions upon immigration made by the immigration act of 1924, approved May 26, 1924. Almost a 50 per cent reduction in the number of admissions to the United States in the present fiscal year, ending June 30, 1925, as compared with the number allowed to land in 1923-1924, was predicted by Representative Albert Johnson, chairman of the immigration committee of the House of Representatives, in a statement recently issued on the basis of a report compiled by the Department of Labor covering the first half of the present fiscal year, ended December 31.

After allowing for the emigrations and deportations the net increase in the population by immigration during that period was less than 100,000. The total number of admissions was 231,368, which would indicate that a total of 462,736 persons of all classes might be admitted during the year, as against 879,302 for the fiscal year 1923-1924, but also twice as many have been deported as under the old law. Moreover, of the 231,000 persons who have entered, only 147,737 were classed as immigrants, while 84,955 were classed as non-immigrants. There were also 57,631 emigrant aliens, 77,672 non-emigrant aliens and 4,448 deportations.

The 1924 law changes the basis for computing the quotas in two particulars. The per cent limit act of 1921 took as a basis the foreign-born persons in the United States as shown by the census of 1910, while the new law takes as a basis the number shown by the census of 1890, which makes a great deal of difference in the number admitted from certain countries from which the railways have drawn much of their labor in recent years. Further, the old law applied 3 per cent to the census enumeration of 1910, whereas the new law applies 2 per cent to the census enumeration of 1890.

The quota for 1924 under the old law provided for the admission of 357,803 immigrant aliens, and the number admitted and charged to the quota, according to the annual report of the Secretary of Labor, was 357,542, as compared with 243,953 and 335,480 in the fiscal years 1922 and 1923 respectively. This year, however, the quota provides for only 164,667. Canada, Mexico and South and Central America, however, are exempt from quota limitation, immigrants being admitted on the basis of their qualifications, and from the non-quota countries 334,889 immigrants were admitted last year, including 200,690 from Canada and Newfoundland and 89,336 from Mexico. For the first six months of this year, however, only 11,701 Mexican immigrants have been admitted while 1,432 emigrated. Approximately 60 per cent of the total admissions are classified as either "non-immigrant", or "non-quota immigrant."

Of the 147,737 immigrant aliens admitted during the first half of the present fiscal year, 80,838 were males and 66,899 were females. Of the total 67,323 came from Europe, 2,302 from Asia, 218 from Africa, 249 from the Pacific islands, 62,024 from Canada, 1,083 from Newfoundland, 11,701 from Mexico, 739 from

Cuba, 310 from the West Indies and the rest from Central and South America and other countries not specified, making a total of 77,645 from the Western Hemisphere. According to another classification given in the report 5,825 were professional, 24,687 were skilled, 53,506 were miscellaneous, including only 13,293 classed as laborers, and 63,719 were classed as of no occupation, including women and children.

What Do We Get From the Appliances Used in Maintenance?

By C. A. MORSE
Chief Engineer, Chicago, Rock Island & Pacific

DURING the days of low prices for common labor and the period of unrestricted immigration, which helped to make this common-labor low-priced, many appliances were produced for doing work more rapidly and with less labor than was required to do it by hand. Among these were steam shovels, steam ditchers, spreaders, air dump cars and, to some extent, section motor cars. But since the short day and high pay have gone into effect a decided impetus has been given to mechanical methods. As a result there have appeared the spreader-ditcher, the tie tamper, the track liner, the disc weeders, the track mower, electric and oxy-acetylene welders, the switch point housing machine, etc. In addition more general use is made of the motor car while, thanks to the use of heaver rail, the rail laying machines and portable rail saws and the mechanical track drill are being used in larger numbers.

In addition to this machinery, general practice calls for the use of treated ties with tie plates and anti-creepers. Many are also oiling track joints and bolts, and in some cases the entire portion of the rail below the head. Greater use is also made of chemical weed destroyers. One of the latest mechanical devices is a machine for cleaning ballast that has become foul. Each of these devices has been introduced for the purpose of saving labor and performing the work cheaper and quicker.

What Do the Accounts Show?

While our locomotives and rolling stock have been increasing in weight during this time, the increase has, as a rule, been accompanied by heavier rail, widened roadbed and an increased depth of ballast, which practically takes care of the greater weight of rolling stock. If any decided benefit has been derived from the introduction of the various machines, and practices above mentioned, we should find a decided decrease in our cost of maintenance of way. Are we finding this saving? If not, why not?

We usually look at the maintenance ratio to see how the maintenance costs of various railroads compare. In doing so, it should be kept in mind that this ratio will vary with the amount of improvement work being done on the different railroads, as well as with the economy of handling ordinary maintenance. But in studying an annual report a fair comparison can be made of the improvement work done during the year by each railroad under review. It would be a great help to everyone, if maintenance in connection with additions and betterment work and the joint facility debits, could be set up separately from what may be termed "ordinary" maintenance. Bearing the above in mind, however, a fair idea can be formed by comparing the maintenance ratios of today and 10 years ago on the same railroad. It would pay each railroad management to look into this matter on its own road, to see how much has been invested in labor-saving devices and methods and then see if there has been a decrease in ordinary maintenance costs commensurate with this investment. The day has passed when, on the face of the returns, it can be taken for granted that a low maintenance of way ratio necessarily means *under maintenance*, for the present mechanical appliances, intelligently and economically handled, can easily effect a reduction of from two to three points in the maintenance of way ratio of any railroad.

Education is Necessary

One of the problems that is encountered in the introduction of mechanical devices and practices that save labor, is the education of the supervisory forces; first, to take an interest in and *use* these devices; and second, to recognize the resulting saving in labor and to cut the forces accordingly. Unfortunately, one can find railroads that are using treated ties and chemical weed destroyers and, in addition, using spreader-ditchers, tie tampers and other labor-saving devices, that are employing the same number of men on a section of the same length that they were employing before they used these machines or methods.

If a road which has long been using treated ties, is only renewing 150 per mile as compared with 300 per mile when it used untreated ties, it should require less labor. If it destroys weeds by the application of a chemical instead of by hand, less labor should be needed. The use of heat-treated joints and bolts and anti-creepers, should reduce the labor on joints 50 per cent., etc. Therefore if a man to the mile was considered a fair working force prior to the use of these modern methods, it should be possible to make a reduction of from one-third to one-half that number now. We know that a section foreman can keep his men puttering around, and can get them on the motor car and ride up and down his section four or five times a day and kill a lot of time, but if he plans his work as he should, with the help of the roadmaster, he should be able to maintain his track with modern methods with a much smaller force of men than he could when everything was hand work.

Programming the Work

Under this new order of things, it is more necessary than ever for the roadmaster to program the work on each section and see that the program is followed. It is also desirable to have a wide-awake supervisor of work equipment on each railroad, whose duty it is to assign the various units of equipment so that they will be in use continuously, and that each roadmaster may know when his turn comes to get certain machines. He should keep the machinery in repair

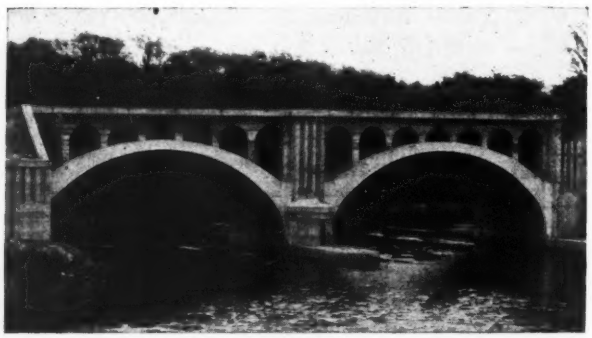
with the least possible loss of time on account of such repairs. A railroad that has lines in the north and also in the south can keep its maintenance of way machinery going the year 'round, and thus get a greater return from a given investment than can a road which is located entirely in the north where the ground is frozen three or four months of the year.

Maintenance of way has reached the point where, today, it is headwork that counts in connection with the use of labor. Careful supervision is what is required, and the more intelligent the supervision, the greater will be the economy secured.

Building Permanent Bridge Reduces Maintenance Forces

By G. A. Haggander
Bridge Engineer, Chicago, Burlington & Quincy, Chicago

About 17 years ago the Chicago, Burlington & Quincy adopted the policy of constructing permanent bridges on main lines when replacement of existing temporary bridges was necessary, timber bridges being constructed only where a change of line or grade was contemplated or where changes might be made in drainage conditions. Timber bridges have also been built on some new line construction where it was not feasible to build permanent structures on account of the difficulty of transporting material. The program for the replacement of main line bridges is not complete as there still remains about 50,000 lin. ft. of timber bridges to be replaced.



Concrete Bridge on the Burlington at Aurora, Ill.

In general, the force employed on bridge work has not been materially reduced because any decrease in force required to maintain the smaller number of temporary bridges has been offset by the force employed on the construction of the permanent bridges which is necessarily larger than that which would have been employed in building wooden bridges. However, the cost figures on bridge maintenance show a considerable decrease and in specific instances where divisions consist largely of main lines and practically all timber bridges have been removed, the force employed on maintenance work has been decreased materially.

On January 1, 1909, there were 656,000 lin. ft. of bridges on the Burlington, of which 156,000 ft. or 24 per cent embraced permanent construction and 500,000, or 76 per cent, temporary structures. On January 1, 1924, the total lineal foot of bridges had increased to 695,000, of which 320,000, or 46 per cent is permanent, and 375,000, or 54 per cent is temporary construction. These figures include both main and branch lines. The total cost of bridge repairs during this period has increased about 10 per cent, or in direct proportion to the increased length of bridges, while the unit cost of labor and material entering into such repairs has increased practically 100 per cent. In other words, the construction of permanent bridges has enabled this road to keep its cost of bridge maintenance practically the same as it was 15 years ago, notwithstanding the large increase in cost of labor and material employed in such work.

In 1909 the bridge force employed on the maintenance of timber bridges on one division consisted of seven gangs totaling 56 men. At present the bridge maintenance on this division is handled by the equivalent of one gang of 8 men. Most of the bridges on this particular division have ballasted decks and the only maintenance work required is the inspection of structures, the painting, replacing and maintaining of decks on open deck structures and work on temporary bridges which have not been replaced.

Fewer Bridge Fires

In addition to the economies effected in maintenance, the interruption to traffic resulting from bridge fires has been materially decreased. In one year there were 17 fires on the bridges of one operating division on the northwestern part of the system where lignite coal is used. Practically all bridges on this line are now permanent and in consequence interruptions due to fires have ceased entirely.

Where ballasted deck structures are installed, the maintenance of track at the ends of bridges is decreased. Permanent bridges also eliminate the necessity for maintaining water barrels and skinning the ground around the piling to protest against grass fires, thus reducing the work of section forces.

If the financial condition of a railroad permits the necessary capital outlay, the expenditure of the construction of permanent bridges is justified where the cost of the permanent bridge does not exceed approximately three times that of a wooden structure, and this ratio may be increased if weight be given to fire hazard, the necessity for long clear openings, and the security of foundations which cannot always be obtained in wooden structures.

Traffic Record—Freight car loadings for the week ended February 7, the last of record, amounted to 928,244 cars, which is an increase of 22,227 cars as compared with 1923, which is taken as a further indication to support statements issued earlier in the year that the freight business of the year will exceed that of preceding years. The freight car surplus for the last week in January showed a decrease of 14,915 cars over the preceding week week, being 213,921 cars, including 69,836 coal cars and 103,209 box cars. Increases are shown in the loading of all classes of commodities except coal and forest products.

Checking the Performance of Machines Insures Greater Output

How One Road Gets More Work Out of Its Pneumatic Tie Tampers by Weekly Progress Records

By I. H. SCHRAM
Regional Engineer, Erie, Chicago

UNTIL just before the World War plenty of cheap labor was to be had and there was little incentive for the development of devices or methods to save labor in maintenance of way work. Development work by individuals was not stimulated and the railroad managements did little to encourage the design of such devices. Following the summer of 1914, however, there was a tremendous increase in manufacturing activity and a great impetus in the demand for labor at higher wages than those paid for railroad maintenance of way work. A decrease in immigration and other factors helped to establish a shortage of common labor which rising wages did not solve. It was then that maintenance of way officers turned to improved and power tools and machinery to help solve the problem which was shortly accentuated by heavy traffic, making proper maintenance more difficult. Requests were made on managements for authorities to purchase many tools and machines. Coupled with the argument of labor shortage was that of economy, and as labor costs mounted higher more prominence was given this argument and more devices were purchased for reasons of economy. The trend of the times was also soon noted by the manufacturers and more and more machines were developed or improved until they came to be useful and economical for maintenance work.

When some of the machines had been on the line for a period enabling their performance to be checked up, it was found that the expected economies were not being realized and that supervisors and foremen who were once demanding them were now letting them stand idle and reverting to hand labor in spite of its greater cost. Methods of supervision then had to be developed to insure the continuous use of the machinery with economical methods. On some railroads the situation was considered of sufficient importance to warrant placing an officer in charge of such machinery, who was a specialist in its use and maintenance. On other roads this duty was imposed on the regular maintenance of way organization.

To obtain the best use of each class of device its use must be studied and treated separately from that of other classes. Motor cars, tie tampers, ditchers, ballast cleaners, spreaders, pneumatic wrenches and drills, paint sprayers and all essentially different. Motor cars were at first hard to keep in continuous service and educational methods were tried. Manufacturers cooperated and sent representatives out to instruct foremen, signal maintainers and others but the results were meager. It developed that repairs had to be taken out of the hands of the operators of the cars in spite of the good results a few obtained and turned over to a real motor car maintenance organization. When this was done results were forthcoming immediately and real economies resulted, for the time lost by a large gang waiting while one man tinkered with the car was eliminated. Regular inspections by a motor car maintainer who makes minor repairs and adjustments on the ground keeps the cars in working order. The same inspection determines when it no longer pays to repair the car locally and it must be sent to the motor car shop to be given a complete overhauling and returned to use with a minimum delay. This inspection also covers the questions of safety railings and similar devices which are necessary to prevent serious injury in accidents.

Pneumatic tie tampers present a more serious problem as several factors enter into their operation. Many were purchased during periods of labor shortage, used for a short time and then permitted to lie idle while the work for which they were purchased was done by hand labor or not done at all. Defective maintenance was blamed for much of this, the usual excuse being that they were out of order too much of the time. By placing an experienced operator with each machine to take care of minor repairs while in use and assigning the repair work to the motor car organizations this excuse was eliminated and better results were obtained on some divisions but not on others. Something further was necessary. The line of least resistance was to give the machines to the supervisors who wanted them and let others do their work by hand. This, however, meant the abandonment of the policy of using the machines on all work for which they are most efficient as light surfacing in hard ballast.

Progress Reports Solve the Problem

The cure prescribed for this was a system of competitive reports indicating the progress of each machine weekly. The reports are based on the supervisors' weekly report, checked in the division engineer's office and sent to the regional office where the report is made promptly for all divisions in blue print form and sent out to be distributed to the track supervisors. The report is simple and cumulative, that is, it is extended on the same tracing as the season progresses. Two columns are provided for each week. One shows the work done with each machine during the week while the other shows the total output for each

tamper unit for the season to date. A machine is seldom moved from a supervisors' territory during the season as the results, viewed over a considerable section of the working season, give an excellent basis of comparison and eliminate the small periods of idleness due to breakdowns, moving and other causes.

Supplementary to the progress table is a comparative cost statement issued at the completion of each job and finally summarized at the end of the year to show the cost of both hand and machine work on similar jobs. This affords satisfactory answers to any arguments concerning the relative costs of both kinds of work and insures a real enthusiasm for the machine work since no one can withstand the argument of economy which the figures show, particularly as the advantage of better work is evident from the start. The cost figures are taken from the daily time slips forwarded through the track supervisor's office to the division engineer, there summarized and advanced to the regional engineer.

The distribution of the progress and cost statements arouses a competitive spirit which insures real effort to get the most out of a machine and greatly cuts down idle time. Genuine efforts are made to perfect the organization. Good work is insisted on and is obtained by frequent inspections.

With these methods the amount of work done by each machine has been greatly increased with the result that an average of approximately 12 miles per machine was obtained with 11 machines employed on one region of the Erie in 1924, including those used on sections where the size of the gang is generally less than that employed with the tampers on extra gang work. The idle time of the machines has been cut down and the number of working hours greatly increased.

It has been found that the experienced operator should accompany the machine and stay with it throughout the season as he is a valuable aid to the supervisor in instructing foremen and is as much interested in obtaining good performance as is any officer. He takes a pride in keeping the machine working and the air pressure at a maximum. If he has a breakdown he notifies the maintainer of the parts required and starts work on the machine himself before the maintainer arrives besides making minor repairs. This plan also has the advantage of training many foremen to the proper method of doing machine tamping and raises the general condition of the track.

Where work of a somewhat heavier nature is to be done and a larger force is required an extra gang organization is set up and works more satisfactorily on such work, as all of the work necessary for a complete job such as unloading ballast and dressing track can be carried on without having the tamper idle.

Specimen Record of Tie Tamper Work
Feet of Track Worked

Kent Division	Sub-Division Number	Week Ending May 16	To Date	Week Ending May 23	To Date	Week Ending May 30	To Date	Week Ending June 6	To Date	Week Ending June 13	To Date	Week Ending June 20	To Date
Tie Tamper No. 126	3	3,484	3,484	4,646	8,130	4,277	12,407	3,907	16,314	2,323	18,637	1,848	20,485
Tie Tamper No. 201	2	3,016	8,032	2,956	10,988	2,693	13,681	3,221	16,902	2,270	19,172	2,640	21,812
Tie Tamper No. 202	2	1,056	17,846	2,534	20,380	3,748	24,128	2,640	26,768	3,168	29,936	1,954	31,890
Tie Tamper No. 203	3	3,010	3,010	2,810	5,820	3,580	9,400	1,640	11,040	3,860	14,900	2,550	17,450
Total Kent Division		10,566	32,372	12,946	45,318	14,298	59,616	11,408	71,024	11,621	82,645	8,992	91,637
Cincinnati Division													
Marion Division													
Tie Tamper No. 224	3	3,330	3,930	3,500	7,430	3,260	10,690	2,850	13,540	2,208	15,748	2,177	17,925
Tie Tamper No. 225	4	5,000	5,600	4,100	9,700	4,400	14,100	2,000	16,100	2,800	18,900	3,000	21,900
Tie Tamper No. 226	2	2,218	7,287	1,795	9,082	1,848	10,930	1,056	11,986	2,218	14,204	4,224	18,428
Tie Tamper No. 227	1	1 550	6,360	2,600	8,960	2,300	11,260	1,350	12,610	3,050	15,660	3,400	19,060
Tie Tamper No. 228	3	2,493	12,395	2,970	15,365	2,475	17,840	1,815	19,655	3,465	23,120	4,758	27,878
Tie Tamper No. 229	2	3 062	12 446	2,587	15,033	2,069	17,102	1,320	18,422	2,904	21,326	4,594	25,920
Total Marion Division		17,653	48,018	17,552	65,570	16,352	81,922	10,391	92,313	16,645	108,958	22,153	131,111
Chicago Division													
Total Chicago Region		28,219	80,390	30,498	110,888	30,650	141,538	21,799	163,337	28,266	191,603	31,145	222,748

The work of ditching machines of either the Jordan spreader or the American ditcher type can be checked similarly if there is sufficient number in service to make it worth while. If not, their work should be programmed similarly to that of the tie tampers, both for the locations of the work and for the time allowance, and the machines held to the program as much as possible. Some elasticity is necessary in this method and allowance should be made for emergencies such as slides, washouts and conditions resulting from heavy rains and unusual work train delays due to heavy traffic and similar causes. A check of performance against program is very necessary, however, and has been found to insure the greatest amount of working time. Locomotive cranes and similar machines used in handling rail and laying it are general service machines and their service cannot be covered by competitive reports and apparently little would be gained thereby, but like all maintenance machines it is essential that they be kept in good repair. Other machines are

Ditchers at Work on the Rock Island

How to Get the Maximum Results From Work Equipment

Centralized Supervision of Machines Can Be Made a Means of Obtaining Greater Return on the Investment

By J. B. MABILE

Supervisor Work Equipment, Chicago, Rock Island & Pacific, Chicago

THE MAINTENANCE of way department has been slow to take advantage of labor-saving machinery and appliances. It has not kept pace with the mechanical department which was confronted with high labor costs for many years before wages advanced in the maintenance of way department. However, various manufacturers are now offering machines and appliances which will greatly reduce the cost of maintenance work when properly manned. Railroads are buying them, and it is therefore fair to enquire if they are getting proper returns on their investments. These machines are adaptable to various classes of work and when given proper study, put on the right job and used in the proper way will bring about a heavy reduction in the cost of maintenance.

To secure the best results on a railroad of any size, machinery and special tools and equipment of this kind should be placed under the direction of a supervisor of work equipment, who should be held responsible for the manning of the machines, the instruction of operators in their use and the supervision and equipping of the machines, in co-operation with the mechanical department. As such an officer should be conversant with maintenance work to the extent that will enable him to discuss the requirements of any job with the division engineer, roadmaster or supervisor, it is felt that the machines are properly manned, that they are maintained in good condition, that they are distributed effectively over the system, that they are used to the best advantage and that the equipment best suited to a particular purpose is assigned to the work to which it is especially adapted.

He Should Know Where Machines Should Be Used

Without proper supervision, work equipment is often used on work for which other machines are better suited. For example, it has been found that much work can be done advantageously with two ditchers or two locomotive cranes that formerly was considered as requiring a steam shovel in accordance with the old belief that such equipment was necessary whenever any considerable quantity of material such as earth or gravel was to be moved. A steam shovel requires a full train crew, five men with the shovel and from four to eight laborers, making a costly organization, unless conditions are such that plenty of cars are available to get a large output from the machine.

I have in mind one instance where a steam shovel was used in a gravel pit, to get out not to exceed 30 cars of gravel per day, at a pay roll cost of approximately $125. Two locomotive cranes were put on the job and loaded promptly all the cars that were placed

for them at a pay roll cost of only about $30 a day, thus effecting a saving of five cents per cubic yard in the cost of loading the gravel. Such questions as this must be given careful study, as little argument can be advanced for the purchase of new machinery unless the much-talked of savings to be accomplished thereby are reflected in the pay roll. We find frequently that owing to lack of study so many unnecessary laborers are employed around a job that the cost is run up to the point that a machine shows no saving in the final analysis.

On short haul work it has been found that two ditchers working in the same train will move material very cheaply. The advantage of moving earth in this way as compared with a steam shovel arises from the fact that the material required for the filling of a bridge, the widening of embankments, the extension of a yard, etc., may frequently be obtained from a number of cuts close to the filling job which need deepening and widening. With the ditchers several of these cuts may be worked out and put in shape so that the section men will not have to do any more ditching in them. Every earth moving job must be studied by itself.

The Supervisor Should See That Full Use Is Made of the Equipment

An enterprising supervisor, well versed in the work that may readily be done with the machines in his charge, can frequently offer suggestions that will make them more useful and eliminate unnecessary hand labor. In filling trestles it has been the custom to dump dirt on both sides of the trestle as long as it can be piled up without interfering with traffic and then have men throw the dirt to the center with shovels. There are plenty of spreading machines today that can put this dirt in the center at an almost negligible cost as it requires only about 15 min. to alter the wings of the spreader to the form required for doing this work at the rate of a mile in ten minutes.

Various roads are killing weeds by the use of chemicals and superheated steam, yet we frequently find that after the weeds have been treated in this manner section men will cut the dead grass to line. This costs more money than to cut the green grass and this added cost is applied against the figures submitted by the man who obtained authority to kill the weeds by the use of chemicals or a burner. We also find that pile drivers are not equipped with proper lights and that they have an old-style hand swing on the carriages, as well as the old-style method of raising leads. Small additions can be made to these at very little expense, making it possible for the operator to do all this from the cab and release a couple of men from the deck.

The tie tamper shows a big saving when properly handled, but we some times find in making a study of the forces employed with some of them that so many men are used with the machines that the payroll cost for labor offsets the advantage gained by their use. These machines are very useful and can be kept busy the year around. During the winter, when not used on track work, the power units can be used to advantage by bridge gangs and frequently by building and water service gangs.

The Right Models and Sizes of Machines Should Be Purchased

Many mistakes have been made in the purchase of devices and equipment. This may be illustrated by the dump car. A few years ago any kind of dump car was so much better than the old flat car, with Lidgerwood and plow, that it "looked good" to the maintenance man. But with modern developments in dump car design the kind of car employed has a marked influence on the payroll expenses as well as on the output, if properly maintained and handled. To my mind each road should have two classes of dump cars—one without aprons for handling heavy rock, and the other equipped with aprons for handling dirt, so as to throw the dirt far enough out to clear the ends of the ties. Cars are available today that will unload the dirt, when properly handled, and cause little fouling of the ballast.

The motor car offers another illustration. One fact that accounts for excessive motor car costs on some railroads is that they were bought in such large numbers of so many different types and makes that it has been difficult to keep them in condition and the men properly instructed in their use. Most roads, however, are now restricting their purchases to certain types of cars for each class of work. Only four types of motor cars are really necessary for ordinary requirements—a section car, a heavy-duty car for the use of bridge and extra gangs and with a weed-mower, a center-driven inspection car for use of officers in traveling over the line, and a side-driven car for use of telegraph and signalmen. Any of these cars, properly used, will soon pay for itself. The heavy-duty motor car is becoming more popular as more uses are found for it, such as the pulling of disc weed cutters for cutting grass and weeds out of ballast shoulder and the pulling of track mowers that mow a seven-foot swath beyond the edge of the ballast line. In some cases they have been used by bridge men working on a frame structure with a gin pole for hoisting the material. They have also been used for pulling ice up an incline and filling ice houses. There is no end to the little jobs that can be done with them, even to back filling ditches for tile drains parallel to a track. Everything depends on the ingenuity of the supervising officer.

Keeping the Equipment in Service

One essential for economy in the use of work equipment is that it be kept in use as large a part of the year as possible. This can be done on any road with lines on the north and the south by doing the northern work in the summer and the southern work in the winter. In such cases, it would be an extravagance to have enough machines to do the work simultaneously all over the system. This is a matter that must be given serious thought by our executives, for we cannot expect to keep good men handling our equipment if we furnish them only six or seven months' work throughout the year. The old idea that a man can be picked out of the water service department to run a ditcher during the summer months is successfully disputed when comparison is made of the results obtained by a road following this practice with the results obtained by a road having regular men on its machines who are furnished with work the major portion of the year.

Another thing that works to the detriment of our work equipment where we do not furnish year round employment is that when "cutting-off time" comes, the average maintenance officer wants to get the work equipment men off the payroll as quickly as possible. The machine is taken to the terminal and frequently tied up by simply draining the boiler to prevent freezing during the winter. This is wrong. If the machine is not in need of repairs, all fittings liable to theft should be removed and the holes left by their removal plugged up, grates should be removed, and the inside

of the firebox and ash pan should be cleaned thoroughly with a wire brush. Flues should be cleaned with a stiff flue cleaner, the top sheet cleaned off, the firebox, ash pan, flues, top sheet, and all exposed parts of the machine greased to prevent rust, and a cover placed over the smoke stack. If the machine is not in shape to go out again on a job, repairs should be made as soon as it is brought in, while the conditions are fresh in the mind of the operator.

Continuous employment for the men the year round, and the proper housing of men who go all over the railroad with their machines are problems that are yet to be solved. They are vital. The contented man is the man who saves money for his employer and if while we study our needs for equipment we give the operator and his assistant sufficient thought to take care of their needs, our problem will be half solved.

The assigning of machines to the jobs on the Rock Island has been done heretofore as the need for machines arose. However, for 1925 a program has been prepared by each division engineer, showing the months in which he wants to use steam ditchers, shovels, ditcher-spreaders, etc., on the division's regular maintenance work. These requirements will be taken care of as requested and in addition after taking care of emergency and "AFE" work, our tentative plan is to make adequate allowance in the maintenance appropriation to run ditching machines not required for the regular program over the main lines of the most important divisions, for the purpose of widening and deepening all cuts to such an extent that the standard ditcher-spreader can be run through them. In some cases they will be widened to whatever width is necessary to obtain the dirt needed to widen or restore the embankments in the vicinity to standard. By doing the work as above outlined, we will increase the usefulness of our ditcher-spreaders and make a further reduction in hand ditching.

The Repair Program

Our repair work is handled by our own men. The shop forces, of course, do the actual machine work, making any bushings or parts that we do not buy from the manufacturers, but the operators and their assistants do the tearing down, rebabbitting, filing and fitting of parts. This arrangement has proved entirely satisfactory. We have long since abandoned the practice of running a machine as long as it will go and then sending it in for emergecy repairs. Since we have followed the practice of putting our machines in shape at the end of each season ready for the next year's work, we have had only one breakdown in three years, and that was due to a condition that could not be foreseen by any one.

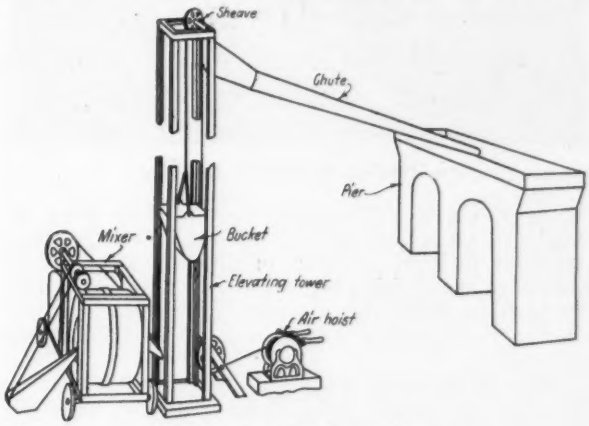
The idea of advocating that a maintenance man have general charge of the equipment should not be misunderstood. The supervisor of equipment should have the advantage of the co-operation of the mechanical engineer, electrical engineer, air brake instructor and chief boiler inspector. On the Rock Island no machines are bought, rebuilt or remodeled without consultation with these officers of the mechanical department and this practice is giving us machinery that is adapted to our work and is mechanically right.

RAILROAD CELEBRATION HELD—Representatives of virtually all of the larger railways were entertained by the Des Moinees Register and the Des Moines Tribune-News at a unique "Railroad Day" in Des Moines on February 11. The feature of the day was the dinner where Iowa's prominent railroad baiters were burlesqued.

Air Hoist Proves Useful On Railroad Bridge Work

THE RECENT construction of a steel and concrete bridge over the yards of the Rutland at Rutland, Vt., where the steel work is said to have been handled at a cost as low as $6 per ton, furnished an interesting application of compressed air equipment in a field where its use for other than riveting work has hitherto been exceedingly limited. The plans called for five reinforced concrete piers, and two reinforced concrete abutments supporting four 20-ton girders with 20-in. I beams for floor supports, the total length of the bridge being about 400 ft.

On this work a portable gas engine-driven Sullivan type WK-311 air compressor having a displacement of 170 cu. ft. of free air per min., driving a single drum hoist of the turbine type (also Sullivan make) was used for handling all of the concrete and for placing the floor beams. In constructing the piers a concrete tower 50 ft. high with a 40-ft. chute was erected. The hoist was bolted to timbers at the base and the rope



The Layout for Concreting

arranged over sheave wheels to raise and lower a concrete bucket between the mixer and chute. The average load on the hoist, including bucket and concrete, was over one ton. With this arrangement it took exactly three minutes from the time the cement and gravel entered the mixer until it was in the forms, one of the piers, containing a total of 65 cu. yd. of concrete, being poured in 10 hr.

The large 20-ton girders between piers were erected by the railroad derrick after the turbine hoist was again used to place the floor beams. This was accomplished by placing two heavy wooden beams across the girders, about 18 in. apart, cross braced at the ends, and bolting the hoist at the center of these beams. A small seat was erected for the hoist operator and the tops of these girders were well greased, so that the crane could be moved.

Each operation consisted of shifting the hoist where one of the floor beams was to be bolted for riveting, whereupon the I-beams, each weighing 1500 lb., were snaked across the railroad yard and lifted into place to be bolted. The men who jacked the crane along the girders also bolted the beams. The beams were placed at the rate of 14 in an eight-hour shift, using five men in the operation. The actual cost of handling the steel work was said to be $.003 per lb. The compressor was later used to furnish air for two riveters to complete the job.

Ditchers on the St. Paul Operate on a Schedule

FOR SEVERAL years past the Chicago, Milwaukee & St. Paul has done practically all of its ditching with Jordan ditcher-spreaders and owing to the large amount of work that can be done in a given time with machines of this type two ditchers have proved sufficient for the entire ditching program being carried out on the lines of this road east of the Missouri river. However, the fact that only two machines were required gave rise to one rather perplexing difficulty owing to the fact that each of them must be employed on a considerable number of independent operating divisions, on each of which it is under the control of the division organization. This introduced the problem of securing a satisfactory allotment of the time of the machines to the various divisions of the railroad.

An Obsolete Method of Ditching

After experiencing some difficulty from this cause a plan was developed under which a definite schedule was prepared for each machine early in the spring of 1923 whereby each division was assigned the use of one of them for a specific number of days. This plan has been fruitful of excellent results. It insures fair treatment for each division, provides that the machines will be actively employed throughout the entire season, cuts down the mileage covered in transferring the machines from one division to another and enables the forces on each division to prepare definitely for the ditching work at a certain time during the season because the division officers have definite assurance that the machine will be available at a predetermined date.

The schedule was based on information supplied by each division superintendent. This included a statement of the total length of the cuts that required ditching, supplemented by an estimate of the number of cubic yards of material to be moved prepared by the division engineer. This information was reviewed by the general roadmaster, who is thoroughly familiar with the conditions on the entire system. After the total mileage of cuts included in the division statements was compared with an estimate of the mileage which the two machines could be expected to cover during a working season, the season's work for each machine was divided into definite allotments of time for each division, to conform as nearly as possible with the statements of requirements set up by the division staffs. These periods were then compared with the calendar and a map of the system for the purpose of determining the order in which the various divisions should receive the machines to insure that they could be transferred from one to another with the least haul.

This completed, a chart was prepared for each machine like the one shown herewith, giving the name of the divisions, the number of working days allotted, the date the machine would be received, the next division to receive it, and the point and date of delivery. The sheet also included certain instructions to the division superintendents with respect to the manner of making delivery and the power to be provided for the operation of the ditcher. The latter instruction is particularly important as the ditching machines can not develop their maximum efficiency unless locomotives of ample power are provided. In issuing the schedule it was made clear to all concerned that it would be abso-

Schedule for Jordan Ditching Machine X-901605—Season 1924

J. R. Meagher—Operator.

Division	Number Working Days Assigned to This Division (Not Including Sunday or Holidays.)	Date Machine Will Arrive on Division.	Next Division to Receive Machine, Point of Delivery, and Date It Must be Delivered		
			Division	Point of Delivery	Date of Delivery
Kansas City	15	May 1	Terre Haute	Delmar Ill.	May 18
Terre Haute	12	May 20	Janesville Line	Rondout	June 4
Janesville Line (C. & M.)	5	June 6	R. & S. W	Janesville	June 12
R. & S. W	15	June 12	Min. Pt.	Janesville	June 29
Mineral Point	10	June 29	P. du C.	Janesville	July 12
R. du Chien	15	July 12	I. & D.	Marquette	July 30
I. & D.	30	July 30	So. Minn.	Woonsocket	Sept. 4
So. Minn.	15	Sept. 5	Dubuque	La Crescent	Sept.23
Dubuque	13	Sept. 23	Iowa Br.	Oxford Jct.	Oct. 8
Iowa—Branches	15	Oct. 8	Illinois	Savanna	Oct. 25
Illinois	8	Oct. 25			

Note to Superintendents:

Receiving Superintendent will keep in touch with delivering superintendent as to arrival of machine on his division, so that he may have all details worked out and get machine to work promptly. No other instructions as to working schedule will be issued from this office other than shown above.

Superintendents should assign the heaviest power in use on the division to this service and see that engine is in good repair. Air pumps on engine should be in good repair and large enough to supply 110-lb. air pressure to the reservoirs on the ditching machine. Where water stations are so located as to necessitate making long runs for water, a water car should be provided in addition to the regular equipment.

Note:—

2 days traveling time has been allowed from K. C. to T. H. Division.
2 days traveling time has been allowed from T. H. to C. & M. Division.
1 day traveling time has been allowed from I. & D. to So. Minn. Division.

W. Shea,
General Roadmaster.

lutely adhered to throughout the season and that no deviations would be made for any reasons whatever. With this definitely understood the plan was well received.

The results have been fully up to the expectations. The St. Paul is organized under the divisional system, each superintendent being in undisputed charge of the operating, maintenance and mechanical forces on his division. Each division superintendent, therefore, took the necessary steps to see that each branch of the service co-operated to the fullest extent in obtaining the maximum service from the ditcher while it was on his division, that the roadmasters were fully prepared for the work, that the necessary work train service was assured and that the mechanical department not only had the power available for the work but also took care of any repairs to the ditcher while it was on the division with a minimum loss of time. Each roadmaster carefully checked up the progress being made with the ditcher while it was on his subdivision and in the event that the progress was less than he had anticipated, work on cuts where the conditions were less urgent was omitted to insure that the cuts most in need of ditching received attention.

The success of the plan is further attested by the fact that it was followed again during the season of 1924 and will be applied during the coming season. Studies are being made to see if it can be applied also to the operations of the weed burners used on the St. Paul lines. The only departure made from the ditcher schedule during the past two years was brought about by a special need arising from heavy rains in certain territories last year, but instead of interfering with the schedule of the ditcher assigned to the territory, arrangements were made to bring in a third ditcher from the lines west of the Missouri river to do the additional work.

We are indebted for the above information to William Shea, general roadmaster, Chicago, Milwaukee & St. Paul, Chicago.

The Progress We Have Already Made

By J. G. Bloom

Engineer Maintenance of Way, Chicago, Rock Island & Pacific, Chicago

IN the old days of railroading, maintenance of way as well as other work was conducted on a hit or miss plan which, of course, meant no plan at all. Generally it was in charge of a superintendent who, in many cases, had had some experience in maintenance duties as a work train conductor, an extra gang foreman or a roadmaster. Many superintendents, however, came up through telegraphing and dispatching service, but in all cases they had roadmasters in actual or direct charge of the work reporting to them, or if a fairly large road, to a general roadmaster. These were all men of large experience in maintenance and usually did good work for those days.

The quality of maintenance they had to provide, however, could not be compared with present-day standards as the rolling stock and loads were light. While material, as a rule, was scarce, they had a plentiful supply of cheap labor in the use of which they were not restricted. Each roadmaster hired all the laborers he thought he needed, figuring generally on 1 man per mile of road during seven or eight months of the year and from ½ to ¾ of a man per mile the balance of the year, or an average of 0.8 to 0.9 of a man per mile for the year, regardless of what the earnings of the road were.

The Engineer Takes a Hand

Then came a time along in the late eighties and early nineties when some of the roads began to displace the general roadmasters with engineers maintenance of way and some put on division engineers. These were, as a rule, young men with some technical education and some little practical track experience gained by contact with or by asking questions of the section foreman and roadmasters, while engaged in their work of setting grade stakes, running curves, staking out new side tracks, etc.

These young engineers were usually not regarded with favor by the old time section foremen and roadmasters and in many instances their stakes were kicked over before they were out of sight. Nevertheless, the roadmasters and section foremen continued to educate them in the practical end of track maintenance and the engineers, having been trained to handle work according to some plan or system, began to make records of work done, tabulating the time required and the cost of certain of the more important units of work, so that by about 1900 a more or less systematic manner of handling this class of work had been devised and we were emerging from the hit-or-miss system. Most of the western roads, however, hung to the old-time roadmaster regime longer than the eastern roads.

I was a division engineer on one of the eastern roads at this time and well remember the fall of 1902 when I prepared the first annual estimate for my division, which was submitted to the engineer maintenance of way about November 15. About a month later we were called into his office where he went over the estimates in detail with us and by the end of the year we were each given our allowance of both labor and material for the ensuing year. We were then required, at the beginning of the year, to spread this amount over the year by months and by accounts. This constituted our program for the year. Of course, the structures, rail and ballast programs, etc., had been decided upon previously.

The Rock Island Plan

We have inaugurated a similar system on the Rock Island for the present year. We asked that each division to prepare an estimate covering the ordinary maintenance by months and by primary accounts. After this was received and gone over carefully by the district officers and again by the system officers and additions were made for the maintenance charges in connection with additions and betterments work taken from the annual budget, we obtained the total estimated maintenance of way expenses for this year. In addition to this, we required each roadmaster to go over each section with the foreman and prepare a program of the work to be done during the year.

While this program will, no doubt, be changed somewhat from month to month, it will give the fore-

men and roadmasters something to work to. This will be a great improvement over the manner in which the work is conducted at present by many of the foremen who have no idea of what they are going to do when they go to the tool house in the morning.

The Motor Car Came First

One of the first labor saving improvements in track maintenance was the motor car which displaced the old hand car, and not only saved from a half-hour to an hour per day for each gang, but put the men on the job fresh and ready to work. You can readily see what this means on our line with 1,140 sections, if they average only a foreman and three men per section.

Later, the heavy duty motor cars came in and they have been improved until they now haul with trailers as many as 75 and 80 men to and from work and frequently take the place of a work train in distributing material.

The mower operated or pulled by a motor car, cutting the weeds from the shoulders of the roadbed does the work of a large number of men with scythes. Mention might also be made of the fact that we have recently experimented with considerable success with a tractor pulling an ordinary farm mowing machine for mowing the right-of-way.

The steam ditcher and the ditcher-spreader replace extra gangs of 40 to 50 men who formerly shoveled the dirt out of ditches on flat cars which were unloaded with a Lidgerwood or plow and cable. I consider these among the most beneficial improvements in track maintenance, as there is nothing more important to track maintenance than good drainage.

Tie tampers, both pneumatic and electric, are a great improvement, not so much because of the savings in the first cost of the work but because the quality of the work done is so much better than that done by hand that it lasts two or three times as long. So there is considerable saving in the end in addition to better and more uniform riding track.

Weed Destroyers Are a Great Help

Another great improvement is derived from weed destroying machines. These are of various types; some burn the weeds with a flame, usually gasoline, others with superheated steam, and still others kill weeds with an arsenic solution, sprayed on the track. All of these methods are of the greatest benefit in rock ballast, where formerly the only method of eradicating the weeds was for the men to sit down in the track and pull them by hand, a slow, laborious and expensive operation known as "goosing" the track.

Another very convenient and effective tool that came onto the market recently is the track liner. Three men, with three of these small tools, can line track faster and better than six or seven men can under the old method with lining bars and main strength and awkwardness. Without them, it is frequently necessary to double up two or three gangs to line track at all.

A device we are working on at present is a small machine for spraying oil on track joints to avoid applying it with brushes or swabs. It can be operated like a paint sprayer, with a motor car. There is a large machine now in use requiring a locomotive to pull it that does excellent work in spraying oil on the rail below the head, the joints, tie plates and spikes. This preserves them from corrosion due to brine drippings from refrigerator cars.

There is also the spray painting machine which has been used successfully in the maintenance of equipment department and which, I feel, will be a success in painting bridges and buildings. Rail laying machines of various types are in use, expediting the laying of rail. We have used different types the last few years. The resawing and re-rolling of rail, and the building up of battered ends of rail by the oxy-acetylene process all effect great improvements in track maintenance by giving good riding track and prolonging the life of the rail.

As to Materials

The above comments relate to improvements in track maintenance so far as labor and the planning of work is concerned. Material should really be a subject by itself, as the proper care and inspection of maintenance of way material and its economical use is a big subject which has received less attention in the past than its importance warrants. In order for us to get better results along this line than we have in the past, it is going to be necessary to increase the supervisory and clerical forces. We must have regular and correct reports of all material received, used, and on hand on each division, by kinds and not by classes as we get it now once a month. For instance, it doesn't mean much to the engineer maintenance of way, the superintendent or the division engineer to know that a certain division had $20,000 worth of Class I-B material on hand at the beginning of the month, received $2,000 worth, used $12,000 worth during the month and had $10,000 worth on hand at the end of the month, because Class 1-B includes angle bars, bolts, spikes, tie plates, nut locks, rail anchors, etc. What he should know is the number of kegs of spikes or bolts, the number of tie plates of various kinds there are, etc., so that he could keep a check on it.

Another very good way of keeping track of material on divisions is to have all tools and material in excess of two weeks' ordinary requirements in track work kept at a central point on the division in charge of a good material clerk, whose duty it would be to see that a sufficient supply of tools and material, and no more, is kept on hand and at the end of the month, report it, and if a surplus should accumulate, make a surplus report of material that could be transferred to another division. This could be made effective if an inspector or representative from the office of the engineer maintenance of way watches conditions.

Need for Improvement

Material purchased for use on special jobs such as rail relay must be delivered on the job to avoid rehandling. The rail program is made at the beginning of the year, rail and fastenings are ordered to be delivered in definite quantities for certain months. About the time the material begins to arrive, we decide to curtail expenses and hold the rail laying over until later, so naturally a lot of material has accumulated. Then again, we may decide to go ahead with the rail laying according to program. Everything is on hand except the angle bars or perhaps the bolts, and at the last minute, we are compelled to postpone the work as it cannot be undertaken until all of the material is on the ground. This leaves us with a lot of material on hand, giving the appearance of a shiftless manner of handling work, while in fact, it could not be avoided as long as we are dependent on the various manufacturers for the delivery of material which doesn't always come on time.

Another Use for the Acetylene Torch

Rail Relayed After Burning Off Battered Ends Gives Good Service on Light Traffic Main Line

Condition of the Rail Ends After Burning

The Rail Ends After the Burrs Were Filed Off

General View of the Rail Yard at San Antonio

FOR A distance of about 85 miles south of San Antonia on the line of the International-Great Northern, the rail in the main track comprises 75-lb. relayers which were inserted over a year ago after having the battered ends burned off by the oxy-acetylene flame. This method of reconditioning old rails was carefully considered from the standpoint of possible injury to the metal before the work was undertaken and the conclusion that no objectionable condition would result has been borne out by the service rendered by the rail since it was inserted in track. No broken rails or other evidences of injury have been detected in the course of careful inspections.

The release of about 100 miles of this rail from tracks between San Antonio and Valley Junction with the laying of 90-lb. rail raised the question as to its disposition because most of it had battered ends and could not be relaid in its condition as taken from the track. For this reason the condition of the rail was carefully studied and it was found that by cutting six inches from each end a serviceable length remained which had good ends as well as fishing surfaces which would take the angle bars with a close fit. After investigating the cost of several methods of sawing the rail it was decided to cut a limited quantity of it with the oxy-acetylene torch and make definite comparisons of the costs and results. As a consequence of these trials it was decided to recondition the entire lot of rail by this process.

As the rail was released from tracks north of San Antonio and it was desired to relay it south of that place it was most convenient to carry out the reconditioning at the South San Antonio shops of the railroad where an Oxweld service plant had been built to supply oxygen and acetylene to various points in the shop area through a complete system of distributing pipes.

A plot of ground of suitable area was found here and laid out with a set of skids placed at right angles between two parallel tracks separated a distance of 100 ft. These skids were made of 75-lb. rail, spiked ball up on 12-in. by 12-in. timbers placed on blocks. The tops of the skid rails are 36 in. above the ground and 24 in. below car floor level. Each skid is 78 ft. long, stopping 9 ft. short of the center line of the east track and 13 ft. from the center line of the west track. This left a space along the west track wide enough for the construction of a push-car runway for the removal of scrap and short lengths of rail from the skids to the storage pile. Four skids were provided, each skid consisting of a pair of skid rails placed 18 ft. center to center, the several sets of skids being set 40 ft. center to center, thus allowing 10 ft. clearance between the ends of 30-ft. rails on adjoining skids.

Three of these skids were used for sorting, cutting and reaming and the fourth skid for temporary crop and short rail storage. These skids were used interchangeably to suit the convenience of operations. Each skid accommodated 120 rails spaced for classification while the complete layout provided for the spotting of eight cars per switch or one at each end of each skid. The rail was received in loads of 90 to 120 rails per car which could be spread out readily upon the adjoining skid for the various operations involved in the reconditioning.

How the Torch Was Held in a Guide

Approximately 90 per cent of the 75-lb. rail was punched for 42-in. six-hole angle bars and in working out the plans for reconditioning it was decided to cut off six inches at each end of the rail, leaving two holes for standard four-hole angle bars, these holes to be reamed for ⅞-in. bolts. As soon as the rails were received on the skid, the first operation was to place them head up for inspection and then eliminate scrap or short lengths by skidding them to the adjoining skid. Following this the second and third holes from the end were

reamed to 7/8 in. diameter, after which the rails were ready for the cutting torch.

The requirements for the cutting of the rail were exacting. It was not only necessary that the cut be made at a fixed distance from the bolt holes but also that it conform to a plane perpendicular to the axis of the rail. It was decided that dependence could not be placed on the operator holding the torch so as to secure this degree of accuracy and that some form of clamp or guide was needed which would hold this torch in a fixed position relative to the length of the rail but allow a swiveling action for its movement in a direction perpendicular to the axis. Two different types of guides were developed which provided suitable clamps for holding the torch rigidly to the rail, its position along the axis being determined by a lug or plug fitting into the second bolt hole. The action of the torch resulted in the formation of burrs or fins on the far side of the cut as shown in one of the photographs, but it was found that with the use of a rasp these burrs could be removed readily, leaving the rail in the finished condition shown in another of the views.

Each car was reloaded with the same rail that was delivered on it with the exception of the scrap and short rails which had been removed for storage. This method

Left—Reaming Out the Bolt Holes. Right—Burning of the Ends of the Rails.

was found advisable because it permitted a close check on the rail received and forwarded.

After considerable experimenting with the organization for conducting the work it was found that a gang consisting of a foreman and 45 men comprised the most convenient and economical force for this work, the distribution of this force and the wages paid being as follows:

1 foreman	$118.00 per month	$4.54 per 8-hour day
1 head cutter	.56 per hour	4.48 per 8-hour day
3 cutters	.40 per hour	10.80 per 8-hour day
4 reamers	.45 per hour	14.40 per 8-hour day
1 tool dresser	.45 per hour	3.60 per 8-hour day
36 laborers	.28 per hour	80.64 per 8-hour day
	Total	$118.46 per 8-hour day

The normal daily output for this organization was seven cars of rail received, handled and forwarded. This ordinarily included the receipt of 800 rails and the reloading of 600 rails, from 50 to 80 rails being held out after having been cut because of odd or short lengths. The maximum day's production was 850 rails in and 714 out.

Using 650 rails as a basis, 1,300 cuts and 2,600 holes reamed, the average labor cost was $0.08763 per cut and $0.00554 per hole, including double handling as part of the cutting operation, or an average of $0.148075 per rail handled or $0.182246 per rail fit to relay. To these figures a material charge of 28 cents must be made per tool hour for oxygen and acetylene plus a monthly bill from the mechanical department for aid and air tools. The Oxweld Railroad Service Company furnished the torches and cutter guides and points as well as an instructor to train the men in the operation of the torches.

The total quanity of rail involved in this work is approximately 100 track miles, but a portion of this rail was punched for four-hole angle bars and was not cut, being used for passing track relay. The tables show the final analysis of the reclamation program:

How the Rail Was Used

Disposition	Miles	Per Cent	Gross Tons
Main line relay, including short lengths for curves and switch turnouts (28,560 rails)	85	85	10,017
Side track relay, including short lengths and four-hole punch rail	9	9	1,060
Scrap—not cut but sorted	2½	2½	295
Cut offs	3½	3½	413
	100	100	11,785

Analysis of Costs

Rail rack construction	$ 200.00
28,560 rails at $0.148075	5,241.85
1,368 burner hours at $0.28	383.00
Small tools	125.15
Mechanical department charges	250.00
Total cost	$6,200.00

Average cost per gross ton reclaimed ..... $0.619047 (10,017 gross tons)

Average cost per gross ton handled ..... $0.526177 ($11,785 gross tons)

Treated Wood Used for Window Sash

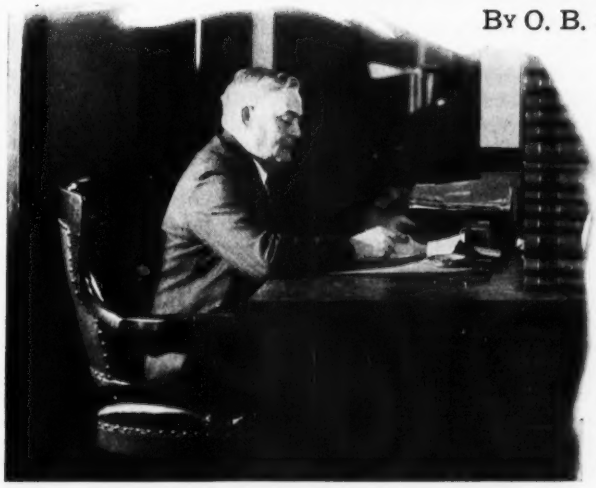
THAT TREATED wood has a much larger range of use than for cross ties, timber trestles and water tanks, is suggested by a description in Wood Preserving News for January, 1925, of a novel undertaking by the Central of Georgia which is replacing the decayed untreated material in all monitor windows of its roundhouse at Columbus, Ga., with treated wood sash.

Although this roundhouse was built only about three years ago the untreated wooden sash has suffered extensive decay under the effects of the moisture in the atmosphere and the artificial moisture produced within the structure. As an experiment it was accordingly decided to replace this sash with treated material. The treated sash includes 10-in. by 14-in. and 12-in. by 14-in. light weight kiln-dried yellow pine timbers 9 ft. long which were impregnated with five pounds of creosote by the empty cell process at the company's plant at Macon, Ga. The railroad's standard color for roundhouse sash is dark green, which soon becomes black from smoke so that the creosoted material has not been considered objectionable from the standpoint of color. While an experiment without precedent it is the opinion of the division forces that the treated sash will live fully up to expectations.

Merit or Prejudice—Which?

The Problem of Introducing Labor Saving Equipment as the Supply Man Sees It

By O. B. Server



Is the Railway Officer too "Busy"?

IT MUST be apparent to anyone who is at all interested in the railroads that there is a wide variation between the practices of different roads in the use of labor-saving equipment for maintenance of way work. When this situation is examined more closely and by one familiar with maintenance matters, the discrepancies which are disclosed are somewhat astounding. There are the heavy-traffic, multiple-track lines in congested territories and there are the light-traffic, single-track lines and all of the roads falling between these extremes. Some of these use labor saving equipment extensively, some scatteringly and some not at all. Every condition on practically every class of road can be duplicated on some other road, yet even among these similar conditions, the same thing prevails. The situation is so divergent that at first glance one is inclined to jump at what seems to be the obvious reason, lack of money, but even a cursory additional glance will show this to be wrong for there are poor roads that are using equipment and prosperous roads that are not. It would seem that in such an established industry as railroading there must be a sound reason for such a situation but actually this is not the case. Like exceptions which prove the rule, there are sound reasons on some roads but they are far outnumbered by the unsound on the others. Why then this situation, and what is keeping labor saving appliances off some of the railroads?

The Adoption of Mechanical Equipment Involves Far More Than Proved Results

The answer is not easy to determine. The promotion of labor saving appliances, and that means the purchase and use of them by the railways, involves far more than the mere demonstration of their ability to do the work quickly, efficiently and cheaply. If this were all, many of the well-seasoned appliances in use on practically all the roads for there are many of them which have been in service over long periods of time and regarding which there have been collected multitudinous cost and performance records. It is not the lack of accurate data regarding equipment and, with some exceptions, it is not a question of money. It is something far more complex than that, although in all fairness it must be said that there are roads that are quick to use and to help in developing equipment based on sound lines and need little more than a convincing demonstration to interest them in something new. The real reason is a complex one because it involves a wide variety of traits of human character such as indifference, lack of initiative, prejudice, self-satisfaction, and others, intensified or exaggerated by the buyer-seller relation which, of necessity, must exist with most labor saving equipment.

These obstacles to the use of equipment or devices are mental obstacles and have little or nothing to do with the merits or demerits of any particular appliance. They are almost invariably in evidence at the introduction of anything new, and remain a handicap even after the initial stages of the use of equipment. However, there are other and added difficulties which appear following the first purchases that often prevent or at least hinder the adoption of additional appliances. These difficulties arise from what is an apparent or real failure of the equipment to fulfill entirely the claims that have been made for it. They come about through the failure to provide an organization designed and charged with the responsibility of seeing that the equipment is used and maintained properly. In other words there is a failure on the part of the railway rather than on the part of the equipment, the railway failing to realize or to appreciate the necessity for constant checking up on the extent and ways in which the equipment can be used, upon its physical condition and upon the way and frequency of its repairs. These are all factors, vital to the success of any device and they are woefully neglected on far too many roads.

Indifference to Labor Saving Equipment Is Indefensible

If any one thing can be stated as being the greatest obstacle to the adoption of labor saving equipment, that one thing is indifference. Why railway men should be indifferent to the advantages of appliances of this nature, as many are, is surprising and although a variety of reasons have been offered from time to time. These hinge upon such factors as a lack of money, supposedly different or impossible traffic conditions, a reluctance to use patented devices or proprietary products, no time for testing, and others. Lack of money, in some few cases, may be a real reason, but most salesmen feel, and experience has usually borne out the impression, that it is more often a smoke-screen thrown up to shut off further selling efforts. It may, of course, be true so far as the man who is being interviewed is concerned, his superiors vetoing any proposed expenditures for mechanical equipment regularly and religiously. Then obviously the executive is at fault, he is "not interested" and it becomes necessary to burrow deeper and locate the real reason for the difficulty.

Once located and corrected, labor saving equipment can be purchased, the financial element taking care of

itself without any undue difficulties. This may, and often does, take considerable time, but obviously the engineer maintenance of way could help materially in reducing this waste of time if he were fully sold. It is not impossible to show that the intelligent use of labor saving appliances has been a real factor, so far as the maintenance department is concerned, in the upbuilding of a number of financially poor roads, struggling up from actual or near receivership under the guidance of a now progressive management. Lack of finances is seldom the real reason. There is nearly always something else behind it, and, using the engineer maintenance of way again as an example, that something else is perpetuated largely because he is not sufficiently interested to make a fight for the equipment.

"We Are Not Interested. Our Conditions Are So Different from Other Roads That We Cannot Use Them"

The only saving grace in such an excuse is that it is seldom offered seriously except by roads that are too well satisfied with themselves, for roads like humans have characteristics quite definable. There are few, if any, roads that are so different from others that their conditions cannot be duplicated to all practical purposes on other roads. Every unbiased maintenance man, whether railroad or supply man, with a broad experience knows this to be an actual fact. No matter how different certain conditions may appear, there is always a common ground from which any "interested" men may work. This has been borne out time and again during the development of labor saving equipment, numerous "entirely different" roads having found that their entirely different condition had nothing at all to do with the successful uses of appliances in one way or another.

Thus it is more than probable that these entirely different conditions are largely imaginary rather than real. Recently in the discussion of a paper on maintenance methods a maintenance officer stated that he could understand how the speaker's road could do certain work, but it would never be practical to attempt to do the same thing on his road as the conditions were entirely different and more difficult. In reply, the speaker took exception to the statement that the conditions were much different and more difficult, and followed by asking if it were not actually a question of what was thought or felt rather than the results of actually trying to do it. He added, "We thought we could not do it but we tried it carefully and found that we could. You see, we simply thought that it couldn't be done."

"We Do Not Want to Buy Patented Products"

No small number of roads exhibit a hesitancy if not an actual antipathy against labor saving devices because they are usually proprietary or patented products. These roads offer the objection that if such equipment is made standard, they are placed at the mercy of the manufacturers, or that if they buy such products they will have to pay more than what they consider a reasonable price for them. Now this may represent a valid criticism of the policies of some manufacturers but it is felt that they comprise exceptions rather than the rule. It offers no excuse, however, for a railway to be uninterested in a device, for it is seldom that it cannot be corrected by a straightforward and frank discussion between the proper authorities of the railway and the manufacturer. The interesting part of this objection is that on the face of it, it is an admission that some manufacturers have products which the railroads need and which if once on the road, it would be difficult or impossible to do without. In other words it is an admission that many devices can be made money savers for the railroad.

There will always be new needs on the railways as a result of the constantly changing conditions of material, labor, traffic and other factors. The railways have neither the time nor the specialists to develop machinery on a commercial manufacturing basis to fulfill these needs. Thus it is up to the manufacturer, but he can succeed only as the railways make progress in the adoption and utilization of mechanical devices. If the railways are slow or reluctant to make use of better equipment there is no incentive to develop better equipment for there will be no market. If, on the other hand, the railways are quick and, in a way, generous in their use of better appliances the development costs of these can be absorbed more quickly, lower prices are made possible and there is some incentive to spend more money in further experimental and development work. This, in turn, reacts to the advantage of the railroad, but it certainly can never expect to secure the results of this progress without paying for it.

Opposition to Patented Articles Wrong

The question of a product being patented should never enter into the question of a contemplated purchase of an appliance. Practically every man in personal affairs will and does prefer proprietary products for the simple reason that they are usually backed by responsible companies and their construction, their materials and their design have been made familiar through much advertising and other publicity. The average man shuns the unmarked, bulk-made products for use in his daily life where quality is a necessity, as experience has proved that they are seldom satisfactory. It should be no different with the railways when it comes to considering labor saving devices, for with these, if with anything at all, quality is a prime necessity. Proprietary railway equipment is usually backed by responsible companies which are on record constantly through their advertisements as to just what can be expected from the products manufactured by them. Such responsible companies must sink or swim according to the merits of their products and they are naturally going to do everything in their power to see that they do their work satisfactorily. Thus when dealing with proprietary products, in addition to buying a device, the railways are also buying a service. The main point in this connection is that a device, to have any merit or to have any sales possibilities, must be able to do something better and cheaper than it can be done without it. Thus if a railroad can do a certain class of work cheaper through the use of a labor saving device there can be no real objection to the product simply because it is patented or because its selling price is perhaps somewhat higher than some railway men believe that it should be. In the long run the entire problem from the railway's side is a dollar and cents one, and the purchase of equipment should be made on the basis of the return it will give and not on any other basis. The railway that keeps postponing the purchase of good labor saving equipment because of prejudices of this nature is hurting itself and the man who follows such a course is not doing that which is best for his road or for himself. He is penny wise and dollar foolish.

Many roads feel that they have no time to experiment with new devices and will not consider running

any tests. This is, of course, a difficult handicap in the developing of labor saving equipment and results in greatly delaying the ultimate adoption of worthwhile devices. Again the railways lose, for by delaying the development of soundly-based equipment, they are postponing their own possibilities of better and cheaper work. A number of years ago a well-known railway man stated publicly that there was an ultra-conservatism that was characteristic of the railways in regard to the trying out or adoption of any new device and that this had amounted to almost an aversion. He stated further that "many a new and promising device has gone to an early grave or lain dormant for many years because of this hesitation to try it out in a practical way. We did not have the nerve to spend a little money to experiment with it and thus develop quickly its possibilities or weaknesses. In the case of any new machine or the adaptation of any new principle of invention, we are going to have trouble at first in its development and find weaknesses, defects and things that are needful of correction. We will never be successful in overcoming them unless we first discover what they are. This can only be accomplished by experimentation." He went on to say that when a new device had been brought to his attention he "like others, was very conservative and wanted to see what the other fellows thought of it and what success they made of it. I preferred to have them develop its weaknesses and its flaws and hence furnished no assistance in this direction myself. I admit that this is a wrong principle and that whenever a new device is correct in principle and looks good from a practical standpoint, all who have need of such a device should assist in trying it out in order to develop it quickly to a state of perfection. It is amazing how many useful devices are available today that we know very little about." The above thoughts were expressed some six years ago, they were quite to the point then, they are still quite to the point today. In view of the fact that the railways have made only slight progress in this direction in recent years, it is possible that it will be quite to the point six years from now.

Incorrect Information or Poorly Conducted Tests Handicap the Purchase of Equipment

Prejudice against anything new or different can be found at one time or another on practically every road and has been a marked factor in keeping labor saving appliances off the railroads. It is found in all positions for there are always men in any rank that prefer to do their work by the old methods rather than to take up anything new. A change of method invariably means a change in the mental effort necessary to conduct any one thing. This means that a greater effort must be put forth than was formerly the case and as the thought processes of most men tend to and very often do get into a rut, there is a natural reaction or prejudice against new devices. There is also a prejudice which arises from an immaturely formed judgment of the capabilities of an appliance, brought about through incorrect or insufficient information or poorly conducted tests. Ordinarily this form of prejudice can be corrected in time but when such prejudice is combined with mental laziness or stubbornness born of misconceived pride, there results a situation extremely difficult of solution by anyone outside of the railroad and even within it. Sometimes this prejudice will reach such a degree that in conducting tests there is an apparent effort to do everything that would hinder the performance of a device and thus bring discredit upon it. For instance, a manufacturer after some years of cultivation at last secured a test order for several appliances on a particular railway. They were installed by the manufacturer's service man, who instructed the men how to use them and for a time supervised their use. As soon as he had left, the devices were taken away from this trained group and shipped to another location with but the barest of instructions. Shortly after that they were again shipped to another location with the result that the machines failed miserably, both in output and service. A follow-up by the service man showed the machines to be badly worn and cracked through neglect and ignorance of the ordinary necessities of care and operation. The machines were completely overhauled by the manufacturer and again installed and operated by the service man. Again they were pulled off and shipped to other locations with the inevitable result that they were shortly in bad order and unusable. Obviously the performance records of this equipment were anything but satisfactory. The manufacturer overhauled this equipment several times and then gave up that road as an impossible proposition, the handicap of prejudice to the point of actual antagonism being too great.

Trouble Often Arises in the Executive Department

It has been stated that where some prejudice has arisen through incorrect information or poorly conducted tests, the situation can generally be cleared up. This is more truly applicable to the officers in the maintenance of way department for when such a situation arises with the executive officers, it almost invariably involves long periods of time. Few executives of the rank of president, vice-president or even general manager are able to find the time to give any detailed thought or study to maintenance devices. As a result, their actual knowledge regarding the merits or demerits of any one device is usually quite limited. This is said with due regard to the fact that many executives have risen to their present rank through the maintenance of way department. Some recognize this condition and place the responsibility upon their department heads and then hold them strictly accountable for results, which is as it should be. Others, however, act independently and upon their own judgment with the result that recommendations or requisitions are often cancelled on their first submission and time after time after that. It is neither easy nor expedient for a department head to tell a president or vice-president that he does not know what he is talking about. In fact, on large roads, he is seldom given the opportunity of discussing such things. So far as the manufacturer is concerned, his chances of seeing the executive and correcting the impression are not good. Thus the adoption of one or more particular types of mechanical equipment may easily be delayed for years until some incident or information may cause a change in the executive's position.

It is surprising what little things will cause these decisive actions on the part of the executive. An actual incident which is also quite typical will serve to illustrate this. A railway president dining at a club overheard the conversation of a number of responsible men who had some railway connections. They were talking about a certain type of labor saving equipment and such talk as he overheard, was unmistakably to the effect that the device was a failure. He returned to his road and inquired whether or not the road had any of these devices. He was told that none had been purchased as yet but that requisitions for some were

then going through. On hearing this, he immediately ordered the requisition killed as the device had no merit. What he did not know was that the men whom he had overheard had been conducting an experiment to determine if the device could be used for work entirely different from that for which it had been designed. Neither did he know that shortly after this, following some changes in the device, it was used successfully for this purpose and large numbers of them had been purchased. The result was that this road was forced to do without some equipment which the maintenance of way department believed in and wanted. Eventually the situation was straightened out but a number of years elapsed before this occurred. This instance may seem, at first thought, to be a little unusual but actually it is fairly typical of a condition that arises frequently owing to the magnitude of the railroads and the multitudinous duties of their executives.

Going Over a Man's Head Never Helps the Purchase of Equipment

Another factor which has a marked bearing on the keeping of labor saving appliances off some railroads is the trouble that results from the apparent or actual "going over a man's head." It is astounding what an effect this will have on even the most sincere, conscientious and usually fair-minded officer. It seems irresistibly to build up a stone wall of antagonism to the device and to the manufacturer that blocks its successful and profitable use on a railway for years. This is a common reaction of the average person and for that reason it will be found in every walk in life. On the railroads it will be encountered from presidents down to section foremen. The greatest damage arises when it occurs among those who are responsible for the conduct of certain departments such as for instance the engineer maintenance of way or the general superintendent or general manager in direct charge of maintenance. With the division engineers, roadmasters and section foremen, the situation may be such that the successful use of equipment may be blocked through having the appliances handed down from above against their natural desires but it is usually only a temporary matter. The resentment or antagonism seems more often to be in proportion to the degree of authority. A number of actual instances will better illustrate what frequently happens, handicapping both the railways and the manufacturer in the use and further development of labor saving appliances than any further discussion.

An engineer maintenance of way of the ultra-conservative type, during the course of time and through the efforts of a manufacturer, became interested in a certain type of labor saving equipment. He investigated the use of the equipment on other roads and had come to a belief that this equipment was successful and profitable to use. As a result he agreed to purchase a number of units for an introductory installation at various points. Shortly after this understanding was reached, the representative of the manufacturer met the president of the road whom he had known personally for a long time. In the resulting conversation, the president asked the supply man how he was getting along with the development of his equipment and, on being told that excellent results were being secured, wanted to know what roads were using it. After these questions had been answered the president asked if his road was using them. He was told that the road was not using them but that an introductory installation would be made very shortly as the engineer maintenance of way was much interested in the device and after investigating it thoroughly, had agreed to purchase a number of units. He then changed the subject as quickly as possible without making it apparent. Some time later an order for one unit came through. The representative followed this up immediately by a personal call on the engineer maintenance of way and after expressing his pleasure at getting the order, inquired if the original plan to purchase a number of units had been abandoned. The engineer maintenance of way replied, "I didn't have anything to do with that order, President Blank bought that unit." An explanation by the supply man followed. The corollary of this incident is that while no offense had apparently been taken, for the supply man was always courteously treated thereafter, no further equipment was ever purchased by that road in the years that followed, the road "never being quite ready to buy."

Another incident concerns the use of a material of a distinctly labor saving nature and now widely used. Early in the use of this material, many years ago, a representative called upon the general manager of a road, this officer being the one responsible for maintenance matters. The general manager gave an impatient hearing to the sales story and a more curt answer. He saw nothing in it, was not interested, did not like the idea and would have nothing to do with it. A few days later the representative, through chance, was introduced to the vice-president in charge of operation on the same road. The vice-president was interested and asked the supply man to call at his office and tell his story, which he did. The vice-president then decided to give it a trial on the road and against the wishes of the supply man called in the general manager at once and instructed him to purchase sufficient material to make a thorough test, the details to be arranged with the supply man by the general manager. For comparative purposes let it be assumed that the material in question was a new kind of paint, which it was not. Thus, comparatively speaking, an understanding was apparently reached that at least a "barrel of paint" would be purchased for test. The supply man returned to the office of the general manager where he was quickly dismissed with the statement that since the understanding was clear in regard to the test, there was no necessity for any further conversation and he must wait until the order was put through. With some misgivings the supply man waited. Finally, after a long delay, the order came through. It was for a "one-quart can." The supply man made a hurried trip to the general manager who refused to see him at that time or subsequently. Shortly after this, the general manager was promoted to vice-president and in all the years that have passed no representative of that company has ever had an interview with that officer and no additional material has ever been purchased by the road.

The Railroad Must Do Its Part in Selling Its Employees

A third incident illustrates the "handing down of something from above" from a different angle. A supply man handling a certain class of equipment had called several times on an engineer maintenance of way located at some distance from his headquarters. On the second or third call, the engineer maintenance of way said, "Why are you running up a lot of expenses to call so regularly on me? Why don't you spend it where it will do you some real good?" The supply man, surprised, said, "Well, you are the man

that has to be sold, you are the man in charge of maintenance, aren't you?", to which the officer replied, "Yes, in a way. Of course, I actually do the buying of equipment of this sort and I am responsible for it. You would make it a lot easier for yourself and for me, too, if you would spend your time out here by going around among the division men. I'm interested, but how about them? If they are interested we'll get some results when the machines are shipped out. If they are not, we won't."

The angle which this incident illustrates deals not so much with actual antagonism to a device being handed down from above as it does with the handicaps which arise from handing out equipment with but slight instructions and still less checking up on its performance or care. In the preceding incident the engineer maintenance of way was both right and wrong. He was right in his facts regarding the profitable use of equipment when the division men were interested. He was wrong in not buying the equipment on his own responsibility if he believed in it and then seeing to it that the equipment was used correctly and that it was kept in proper working order. It is far more the duty of the railroad to educate and interest its employees to use equipment properly than it is of the manufacturer.

Very often this educational work can be concentrated to considerable advantage among certain groups and results secured that will set an example which will serve to stimulate an interest and even a spirit of rivalry among others. One road which had purchased a considerable number of appliances and installed them at various points on each division, soon found that the results varied over a wide range. Some of the divisions obtained excellent results, others apparently could not. A personal check by the engineeer maintenance of way brought to light a variety of reasons why they should work and did work and why they could not work and did not work. It was obvious to him that something other than the equipment was at fault. He, therefore, consolidated all the appliances on one division where they were used for one year. The outcome was that they did excellent work and the engineer maintenance of way was thoroughly convinced that his organization was at fault. The equipment was again re-distributed to the different divisions and orders issued that they *must* be made a success, the results of the previous year being cited to show what could be done. At the same time the divisions were given the proper organization for handling them. After that they were a success.

Divisional tests often bring out amazing and sometimes humorous results. One road which was using considerable amounts of a certain type of equipment, decided in the interests of economy to standardize on one make only in future purchases. In order to do this it was felt that the two types most seriously considered should be given a thorough test under similar conditions. Accordingly, two divisions were chosen and each furnished with equipment of both makes. A study of the ensuing reports was most interesting. On the first division all of the "A" type of equipment was found to have produced excellent results with but little upkeep expense, while the "B" type of machines were constantly in trouble and were charged with heavy repair bills. An examination of the reports of the second division brought to light that on this division all of the "B" type equipment was giving excellent service while the "A" machines were invariably in trouble and running up high repair bills. It can be seen from this that divisional or other concentrated tests must be watched carefully. Otherwise there is always the possibility that the results may be so inconclusive as to postpone any definite action for some further time.

The Railroads Must Organize to Insure Proper Returns from Equipment

One of the greatest handicaps to the increased use of equipment on a large number of railroads is a lack of appreciation on the part of the railroad of what is necessary to insure satisfactory and profitable service. This results in most cases in there being a distinct lack of organization for supervising, handling and repairing labor-saving appliances. It is of the utmost importance to the railways, if the best results and the greatest economies in maintenance work are to be obtained, that the question of organization be considered thoroughly, definite instruction for the use and repair of equipment issued and some one party or parties held strictly accountable for the proper concurrence of everyone with these instructions. This necessity was well summed up in an editorial which appeared a year or so ago in an issue of *Railway Engineering and Maintenance*. This editorial said:

"Some railway officers seem to think that any labor-saving device, once it has been established in service, with even the most perfunctory demonstration to the men, will immediately begin to pay dividends on its purchase price. It is not surprising, therefore, that they begin to register surprise, disappointment and even disgust when they find that their expectations are not being realized. Any piece of equipment, no matter how well established its merits may be, requires three primary requisites for its successful use. It must be operated correctly and effectively; it must be used whenever it can be of economical service, and it must be kept in repair.

"When a new device is being introduced, the manufacturer will frequently take it upon himself to see that these conditions are fulfilled, but the expense of such supervision comes under the head of "Development Cost" and cannot be considered as anything but an introductory measure of short duration. Eventually, therefore, the responsibility for the proper utilization of any equipment is strictly up to the railway officers themselves."

It has been the experience of those roads taking the greatest interest in labor-saving equipment, that where all parties have co-operated sincerely and fully in the introduction of soundly designed devices, they have worked out successfully and have paid a good return on the investment. In many cases, when careful studies have been made of the equipment, it has been found practicable to use it to good advantage for purposes other than those for which it had originally been designed or purchased. This has broadened the field of usefulness of the devices and brought a still greater return on the investment. In connection with this it is worth while calling attention to a fact quite noticeable in industry in general, which is, that the more extensively industry has utilized mechanical equipment, the more rapidly it has developed. This result can be attributed entirely to labor-saving equipment, but is brought about through that and other factors. The introduction of labor-saving equipment generally means a change in methods, necessitating a careful study of conditions within the industry. These studies may and often do bring to light other possibly advantageous changes with the result that a newer and broader viewpoint is secured and, in the end, methods and practices are invariably improved throughout.

Appliances Association Completes Exhibit Plans

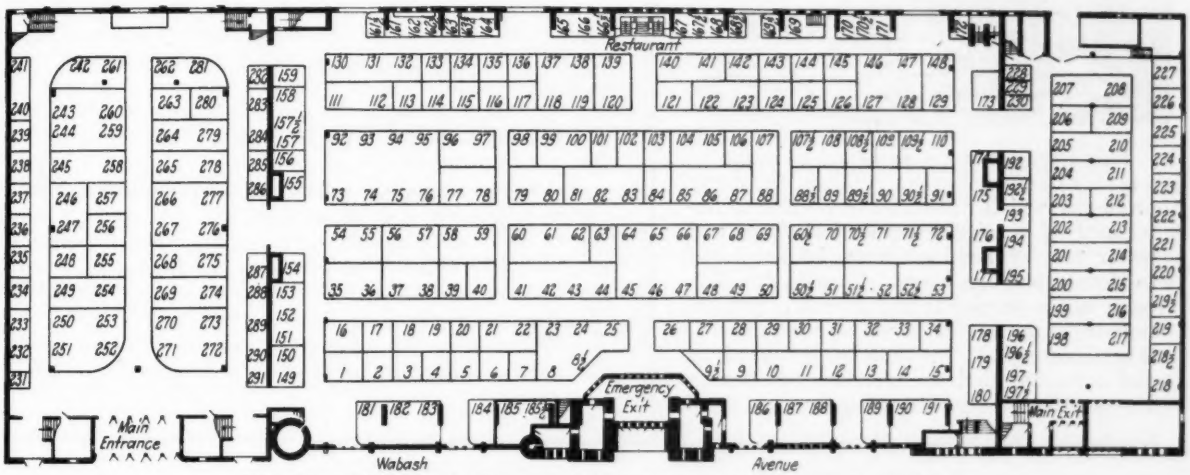
WITH AN increase of almost one-third in the floor area of the Coliseum at Chicago, as a result of the construction of a large addition at the north end of the building, the National Railway Appliances Association will present its seventeenth annual exhibit for four days during the second week of March, under much more favorable circumstances than formerly. The added space not only permits some of the older exhibitors to occupy more space than formerly and enables the management to assign booths to a larger number of exhibitors than was the case last year, but also leaves a small amount of space for companies which have not yet completed their arrangements. According to the latest information, 176 companies have taken space.

As in previous years the exhibit will open on Monday morning, March 9, and will close at 1 o'clock on Thursday afternoon. Following is a list of the exhibitors.

List of Exhibitors

Adams Motor & Manufacturing Company, Chicago, booths 218 and 218½.
Adams & Westlake Company, The, Chicago, booths 250, 251, 252 and 253.
Air Reduction Sales Company, New York, booths 167, 167½, and 168.
Alan Wood Iron & Steel Company, Philadelphia, Pa., booth 209.
American Bolt Corporation (Boss Nut Division), Chicago, booth 1.
American Car & Foundry Company, Chicago, booth 257.
American Castings Company, Birmingham, Ala., booths 243, 244, 259 and 260.
American Chain Company, Inc., Bridgeport, Conn., booths 81, 82 and 83.
American Hoist & Derrick Company, St. Paul, Minn., booths 37 and 38.
American Malleable Castings Association, Cleveland, Ohio, booths 181, 182 and 183.
American Railway Hydrant & Valve Company, Stapleton, S. I., N. Y., booth 159.
American Steel & Wire Company, Chicago, booths 265 and 278.
American Three-Way-Luxfer Prism Company, Cicero, Ill., booths 282, 283 and 284.
American Valve & Meter Company, Cincinnati, Ohio, booths 130, 131 and 132.
Ames Shovel & Tool Company, Boston, Mass., booth 237.
Anchor Company, Milwaukee, Wis., booths 163½ and 164.
Andrix Lock Nut Company, Inc., Adrian, Mich., booth 161½.
Arcco Anti-Rail Creeping Company, Inc., Owego, N. Y., booth 168½.
Armco Culvert & Flume Manufacturers' Association, Middletown, Ohio, booths 99 and 100.
Atlas Portland Cement Company, Chicago, booth 101.
Baker R. & L. Company, Cleveland, Ohio, booths 205 and 210.
Balkwill Manganese Crossing Company, Cleveland, Ohio, booth 116.
Barber Asphalt Company, Philadelphia, Pa., booth 163.
Barrett Company, New York, booth 236.
Bethlehem Steel Company, Bethlehem, Pa., booths 70½, 71, 71½ and 72.
Blaw-Knox Company, Chicago, booth 89.
Brach Manufacturing Company, L. S., Newark, N. J., booth 2.
Brown Rail Loader Company, Boston, Mass., booths 229 and 230.
Bryant Zinc Company, Chicago, booths 287, 288, 289, 290 and 291.
Buda Company, Harvey, Ill., booths 45, 46, 47, 64, 65 and 66.
Burress Grade Crossing Protection Company, Ft. Worth, Tex., booth 3.
Carbic Manufacturing Company, Duluth, Minn., booths 165, 166 and 166½.
Carnegie Steel Company, Pittsburgh, Pa., booths 268 and 275.
Carter Bloxonend Flooring Company, Kansas City, Mo., booth 4.
Central Electric Company, Chicago, booth 17.
Challenge Company, Batavia, Ill., booth 109.
Chausse Oil Burner Company, Elkhart, Ind., booth 223.
Chicago Bridge & Iron Works, Chicago, booths 50½ and 51.
Chicago Flag & Decorating Company, Chicago, booth 189.
Chicago Malleable Castings Company, West Pullman, Chicago, booth 142.
Chicago,Pneumatic Tool Company, New York, booths 118, 119, 137 and 138.
Chicago Railway Signal & Supply Company, Chicago, booth 108½.
Chipman Chemical Engineering Company, Inc., New York, booth 89½.
Clark Car Company, Pittsburgh, Pa., booth 115.
Cleveland Frog & Crossing Company, Cleveland, Ohio, booth 90.
Cleveland Railway Supply Company, Cleveland, Ohio, booth 133.
Concrete Surfacing Machinery Company, Cincinnati, Ohio, booth 219½.
Copperweld Steel Company, Chicago, booth 13.
Crerar, Adams & Co., Chicago, booth 28.
Cullen-Freistedt Company, Chicago, booths 201 and 214.
Dearborn Chemical Company, Chicago, booths 199 and 216.
Detroit Graphite Company, Detroit, Mich., booths 58 and 59.
Diamond State Fibre Company, Bridgeport, Pa., booth 117.
Dickinson, Paul, Inc., Chicago, booth 88½.
Dilworth, Porter & Co., Inc., Pittsburgh, Pa., booth 27.
Duff Manufacturing Company, Pittsburgh, Pa., booths, 35 and 36.
Edison Storage Battery Company, Orange, N. J., booth 20.
Edison, Thos. A., Inc., Primary Battery Division, Bloomfield, N. J., booths 18 and 19.
Electric Storage Battery Company, Philadelphia, Pa., booth 40.
Electric Tamper & Equipment Company, Chicago, booths 204 and 211.
Elwell-Parker Electric Company, Cleveland, Ohio, booths 200 and 215.
Fairbanks, Morse & Co., Chicago, booths 73, 74, 75, 76, 92, 93, 94 and 95.
Fairmont Railway Motors, Inc., Fairmont, Minn., booths 41, 42, 43 and 44.
Fleming & Son Company, J. R., Inc., Scranton, Pa., booth 169½.
Frog Switch & Manufacturing Company, Carlisle, Pa., booths 51½ and 52.
General Electric Company, Schenectady, N. Y., booths 270, 271, 272 and 273.
General Railway Signal Company, Rochester, N. Y., booths 48, 49 and 50.
Godwin Company, W. S., Inc., Baltimore, Md., booth 235.
Graver Corporation, East Chicago, Ind., booths 96 and 97.
Gustin-Bacon Manufacturing Company, Kansas City, Mo., booth 238.
Hackmann Track Liner Company, Chicago, booth 224.
Hall Switch & Signal Company, Garwood, N. J., booths 85, 86 and 87.
Handlan-Buck Manufacturing Company, St. Louis, Mo., booths 264 and 279.
Hayes Track Appliance Company, Richmond, Ind., booths 140 and 141.
Hazard Manufacturing Company, Wilkes-Barre, Pa., booths 21 and 22.
Headley Good Roads Company, Philadelphia, Pa., booths 157, 157½ and 158.
Hoffman Manufacturing Company, Andrew, Chicago, booth 234.
Howlett Construction Company, Moline, Ill., booth 186.
Hubbard & Co., Pittsburgh, Pa., booth 106.
Hunter Railway Equipment Company, Buffalo, N. Y., booth 212.
Illinois Steel Company, Chicago, booths 269 and 274.
Ingersoll-Rand Company, New York, booths 207 and 208.
International Signal Company, New York, booth 114.
Jaeger Machine Company, Columbus, Ohio, booth 30.
Johns-Manville, Inc., New York, booths 174, 175, 176 and 177.
Jordan Company, O. F., East Chicago, Ind., booths 60, 61 and 62.
Kalamazoo Railway Supply Company, Kalamazoo, Mich., booths 8, 8½, 23, 24, 25.
Kaustine Company, Inc., Buffalo, N. Y., booth 144.
Kelly-Derby Company, Inc., Chicago, booth 29.
Kentucky Rock Asphalt Company, Louisville, Ky., booth 156.
Kerite Insulated Wire & Cable Company, New York, booths 88 and 107.
Keystone Grinder & Manufacturing Company, Pittsburgh, Pa., booth 193.

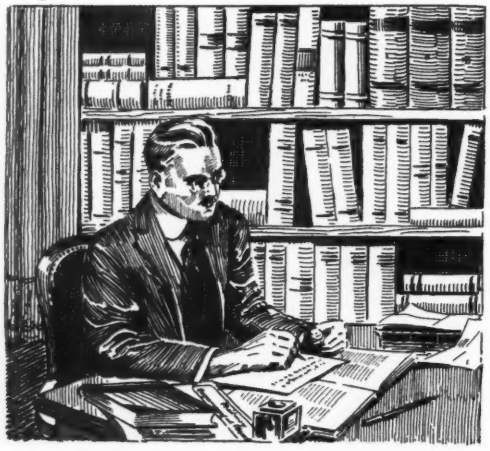
Keystone Steel & Wire Company, Peoria, Ill., booth 263.
Layne & Bowler Company, Memphis, Tenn., booth 206.
Lehon Company, Chicago, booth 91.
Locomotive Finished Material Company, Atchison, Kans., booth 143.
Lorain Steel Company, Johnstown, Pa., booths 266, 267, 276 and 277.
Louisville Frog & Switch Company, Louisville, Ky., booth 203.
Lufkin Rule Company, Saginaw, Mich., booth 121.
Lundie Engineering Corporation, New York, booth 90½.
Lundy Company, E. A., Pittsburgh, Pa., booths 240 and 241.
MacRae's Blue Book Company, Chicago, booth 154.
Magnetic Signal Company, Los Angeles, Cal., booth 7.
Maintenance Equipment Company, Chicago, booths 194 and 195.
Massey Concrete Products Corporation, Chicago, booths 54 and 55.
McGraw Hill Company, New York, booth 155.
Mechanical Manufacturing Company, Chicago, booths 245 and 258.
Mercury Manufacturing Company, Chicago, booths 202 and 213.
P. & M. Company, Chicago, booths 122 and 123.
Pocket List of Railroad Officials, New York, booth 26.
Portland Cement Association, Chicago, booths 285 and 286.
Positive Rail Anchor Company, Marion, Ind., booths 178, 179 and 180.
Pyle-National Company, Chicago, booths 190 and 191.
Q. & C. Company, New York, booths 120 and 139.
Rail Joint Company, New York, booths 79 and 80.
Railroad Accessories Corporation, New York, booths 14 and 15.
Railroad Supply Company, Chicago, booths 104 and 105.
Railway Engineering and Maintenance, Chicago, booth 256.
Railway Purchases and Stores, Chicago, booth 231.
Railway Review, Chicago, booth 280.
Ramapo-Ajax Corporation, Hillburn, N. Y., booths 109½ and 110.
Reade Manufacturing Company, Jersey City, N. J., booths 2 and 261.
Reliance Manufacturing Company, Massillon, Ohio, booth 135.
Richards-Wilcox Manufacturing Company, Aurora, Ill., booths 170, 170½ and 171.
Roberts Company, Geo. J., Dayton, Ohio, booth 136.



The Floor Plan of the Coliseum Where the Appliances Will Be Shown

Metal & Thermit Corporation, New York, booths 262 and 281.
Milburn Company, Alexander, Baltimore, Md., booths 161, 162 and 162½.
Miller Train Control Corporation, Danville, Ill., booths 249 and 254.
Morden Frog & Crossing Works, Chicago, booths 69½ and 70.
Mudge & Co., Chicago, booths 127, 128, 146 and 147.
Murdock Manufacturing & Supply Company, Cincinnati, Ohio, booth 134.
National Boiler Washing Company, Chicago, booth 12.
National Carbon Company, Inc., Cleveland, O., booths 151, 152 and 153.
National Lead Company, New York, booths 187 and 188.
National Lock Washer Company, Newark, N. J., booth 192.
National Malleable & Steel Castings Company, Cleveland, O., booth 102.
National Safety Appliance Company, Chicago, booths 149 and 150.
National Vulcanized Fibre Company, Pittsburgh, Pa., booth 126.
Nelson Manufacturing Company, B. F., Minneapolis, Minn., booth 172.
Nichols, Geo. P. & Bro., Chicago, booth 173.
Northwestern Motor Company, Eau Claire, Wis., booths 196, 196½, 197 and 197½.
Ogle Construction Company, Chicago, booth 31.
Ohio Brass Company, Mansfield, Ohio, booth 255.
Okonite Company, Passaic, N. J., booth 16.
Oxweld Railroad Service Company, Chicago, booths 10 and 11.
Page Steel & Wire Company, Bridgeport, Conn., booth 84.
Patterson, W. W., Company, Pittsburgh, Pa., booth 145.
Pittsburgh-Des Moines Steel Company, Pittsburgh, Pa., booth 98.
Robertson Company, H. H., Pittsburgh, Pa., booth 248.
Rife Engine Company, New York, booth 222.
Roberts & Schaefer Company, Chicago, booth 34.
Robertson & Co., Wm., Chicago, booth 184.
Sellers Manufacturing Company, Chicago, booth 124.
Sherwin-Williams Company, Cleveland, Ohio, booth 125.
Signal Accessories Corporation, Utica, N. Y., booth 113.
Snow Construction Company, T. W., Chicago, booths 107½ and 108.
Southern Signal Company, Inc., Louisville, Ky., booth 6.
Sunbeam Electric Manufacturing Company, Evansville, Ind., booth 239.
Templeton-Kenly & Co., Ltd., Chicago, booths 32 and 33.
Torchweld Equipment Company, Chicago, booth 5.
Union Switch & Signal Company, Swissvale, Pa., booths 67, 68 and 69.
U. S. Wind Engineering & Pump Company, Batavia, Ill., booths 111 and 112.
Verona Tool Works, Pittsburgh, Pa., booths 129 and 148.
Warren Tool & Forge Company, Warren, Ohio, booth 9.
Waterbury Battery Company, New York, booth 39.
Western Electric Company, Inc., Chicago, booths 77 and 78.
Western Wheeled Scraper Company, Aurora, Ill., booth 63.
Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., booths 56 and 57.
Wharton, Jr., & Co., Inc., Wm., Easton, Pa., booths 52½ and 53.
Wheeling Corrugating Company, Wheeling, W. Va., booths 246 and 247.
Wood Shovel & Tool Company, Piqua, Ohio, booth 219.
Woolery Machine Company, Minneapolis, Minn., booths 232 and 233.
Wood Conversion Company, Cloquet, Minn., booth 220.
Wright Manufacturing Company, Lisbon, Ohio, booth 192½.
Wyoming Shovel Works, Wyoming, Pa., booth 103.
Zenith Shovel Company, Chicago, booth 221.

What's the Answer?



This department is designed to serve as a reader's service bureau, wherein the many problems which arise in the routine maintenance of tracks, bridges, buildings and water service facilities, may be subjected to frank and thorough discussion. The value of the service thus rendered is proportionate to the extent to which readers avail themselves of it, in submitting questions and in lending their co-operation by offering answers to the questions presented.

Questions to Be Answered in May

1. Is the installation of annunciators in crossing flagmen's shanties at points of limited or obscured vision to be recommended?

2. To what extent can the added expense for ballasted decks on bridges be justified by the reduction in the cost of track maintenance thereon?

3. To what extent is it practical to send a small gang ahead of a large rail relaying gang to loosen joints, withdraw extra spikes on curves, remove crossing plank and do other special work to avoid delay to the larger gang?

4. What is the effect on the workability of concrete resulting from the presence of flat particles in the coarse aggregate and how should it be overcome?

5. To what extent is the use of dating nails in ties justified as an aid to track foremen in determining the ties to be renewed?

6. What is the most economical width to dig pipe line trenches for various depths and soils?

7. Under the agreements now in effect with the train service brotherhoods, what measures can maintenance of way officers adopt to insure the assignment of efficient crews for work trains?

8. To what extent should the possible loss in heat be given consideration in the selection of smoke jacks for roundhouses?

Keeping Records of Heaving Track

To what extent should track foremen make a record of those parts of their track which have heaved so that remedial measures may be taken next spring?

Marking the Ties Helps

By George VanValkenburg

Foreman, New York, New Haven & Hartford, New Haven, Conn.

My method of overcoming heaving is to mark the ties where the heaviest shims are and to note if the track is on gravel, cinders or slag ballast, as these ballasts do not heave much, most of the heaving occurring in inferior ballast. With this record the supervisor can then unload cinders, slag, or good gravel at the proper points, dig out the troublesome places to a depth of three feet below the bottom of ties and fill in with good ballast.

Records Should Be Kept

By John Shaw

Roadmaster, Buffalo, Rochester & Pittsburgh, Punxsutawney, Pa.

Track foremen should make an accurate record of every place where track has heaved or developed soft spots during the winter and early spring. The one cause for the condition is water and by marking carefully the location of the trouble, plans can be made for drainage later in the season. The proper use of drain tile or judicious ditching will in most cases rectify the conditions that cause heaving. Conditions often develop in winter or early spring that do not exist in other parts of the year. The locations where settling occurs on fills should be particularly well recorded as they usually indicate water pockets which can be drained later by the insertion of drain tile in the fill at right angles to the track.

Rail Marking Preferred

By F. Liston

Canadian Pacific, Vaudreuil Station, Quebec

No phase of maintenance of way activities should be of greater interest or of more importance to supervising officers of railways in the northern belt than counteracting the tendencies towards track upheavals during the winter seasons. It should be the object of all track foremen, whether they are stationed on branch or fast running main lines, to maintain the riding top as near as possible to the same degree of perfection in winter as it is maintained during the summer season.

To attain this all the different points where upheavals have taken place should be marked at the time of shim removals by means of marks made on the web of the rail with white paint and a record kept of the extent of the upheavals. After the completion of tie renewals the section forces should then give their attention to the removal of the causes which brought about these disturbances during the previous winter.

The one real solution for these conditions in locations where upheavals requiring the use of large shims

have occurred is to dig directly to the seat of the trouble and cut off the water from the pocket by proper means of drainage, then to refill it with clean porous material. This treatment, however, does not eliminate all of the shimming in our northern latitudes. As a matter of fact it sometimes brings about a condition which necessitates the use of shims on account of the spots which were dug out staying low, for it is not always possible to judge the proper distance to dig down. Moreover, the material used in backfilling may still retain more or less moisture and finally the frost does not work to the same depth in the same ground each year. However, it reduces the thickness and the number of the shims required. When the work is done thoroughly and properly some of the places remain permanently cured.

Small upheavals which are too numerous to be dug out and which are the cause of choppy riding track are generally improved and often completely cured when the track can be given a raise with a good porous material.

A Book Record Should Be Kept

By J. B. Kelly
General Roadmaster, Minneapolis, St. Paul & Sault Ste. Marie, Minneapolis, Minn.

The question is important in our northwest territory at this time because we experienced exceptionally cold weather early in the winter and the lack of a snow-blanket to aid in keeping frost from penetrating deeply into the roadbed has caused the old heaves to appear.

We know that a proper depth of good ballast and ditching will eliminate many heaves, but despite the reasonable depth of ballast, ditching, etc., there are many heaved spots that get beyond control and call for almost daily attention in reshimming, bracing, providing spreader ties, etc., finally the operation of the line is interfered with by the issuance of speed restrictions.

This means that certain heaved spots should get special treatment and that the roadmaster should designate just what spots are to be considered. The foreman or possibly the roadmaster should then mark the details of the heave by using two different colors of paint; say, blue paint to indicate the shimming and red to show the location of the heave, exercising care to mark the beginning and ending plainly as well as to spot mark a tie here and there to show the extremes. This marking should be recorded in a book giving the location by station and the number of poles east or west of the mile post, the length of heave, the length and height of shimming each way from the heave, the number of shim braces, spreader ties, etc., used. The roadmaster is then equipped with general information for action. The most important thing to be done then is to determine the depth to dig beneath the ballast or ties to get results.

Digging at too great a depth will produce a condition wherein it shall be necessary to place shims to span a depression that formerly heaved and therefore an experiment should be made in various localities to determine the depth of objectionable material to be removed to produce uniformity in heaving.

Places that may be taken care of with ordinary shimming need not be recorded or worked, but the real heaves that come with each successive winter should be dug out. Good results with corresponding interest on the part of foremen may be gained by going into the situation moderately. Replacement with good material for from one to three feet beneath the ballast line will usually answer the purpose.

There are many arguments against digging which may be all right for certain conditions, but digging is the answer for heaves that come with regularity each winter. Some foremen carry what are called summer shims over heave areas and these shims are removed in the winter during the process of the heave, when it is more difficult to carry shims than in summer season.

Roof Drainage for Cold Climates

What method of roof drainage is recommended for northern climates to insure that gutters will not be clogged with ice when the roof snow is melting?

Disconnect the Down Spouts

By D. Rounseville
Assistant Chief Engineer, Chicago & North Western, Chicago

I cannot recommend a method of roof drainage that would be practical and provide a roof drainage that would be a success when the snow is melting in the spring. The most practical method appears to be as follows: When the winter arrives, the down spouts should be disconnected so that they will not freeze up and burst. When snow commences to melt in the spring, steps should be taken to clean all the snow and ice from the roof and gutters after which the down spouts may again be connected with the gutters.

The Use of Salt Helps

By Martin Kane
Superintendent of Buildings, Delaware & Hudson, Albany, N. Y.

About 60 per cent of the Delaware & Hudson lines are in a northern climate and while there are many miscellaneous buildings in this territory, no fixed method has been determined upon for protecting the gutters from clogging up from freezing water. The best results in such climates have been obtained with Philadelphia made gutters, and all gutters are preferably sprinkled with salt to keep the spout outlets open during the winter months. On the larger and more modern buildings steam is injected in the spouts where possible, this steam being obtained from the radiator system.

Stringer Spacing on Ballasted Trestles

Creosoted ballast trestle decks are formed either by a close placing of stringers or by supporting a plank floor on stringers placed some distance apart. What are the relative merits of these two forms of construction, aside from considerations of first cost?

Close Spacing for Short Spans Only

By Geo. W. Rear
Engineer Bridges, Southern Pacific, Pacific System, San Francisco, Cal.

Since questions of first cost have been eliminated from consideration, there remain only the physical advantages or disadvantages of the two types to discuss in arriving at the relative merits of the two forms of construction of ballasted deck trestles. The close placing of stringers permits a somewhat thinner floor, and it is my opinion that this type should be limited to short spans where the stringers can be laid flat.

It has been the experience on the Southern Pacific that where square timber or timber with a greater height than width is used with close spacing, some twisting of the timber takes place, creating small openings between stringers, into which the finer ballast sifts. The continual working of this ballast has a tendency to crowd the stringers apart, making the

condition worse. This is especially true of the outer stringers which carry no live load. This condition is not observed where the width of the stringers is greater than the height, as with 8 in. by 16 in., or 12 in. by 16 in. timber, etc., laid flat.

The use of a plank floor on stringers spaced some distance apart provides for a more uniform loading of the stringers and overcomes the objection described above. It also permits of a more economical use of timber, providing a stiffer floor with less material.

Pipe Line Freezing During Thaws

Is there a danger of underground pipe lines which have given no trouble during the winter freezing during sudden thaws? If so, what is the explanation and what precautions should be taken to prevent the trouble?

The Thaw Is Not the Cause

By J. A. Crawford
Bridge and Building Master, Canadian National, Saskatoon, Sask.

A sudden thaw will not cause an underground pipe line to freeze, though the majority of freeze-ups in pipe lines of doubtful depth do take place in the spring and early summer. The cause is as follows: Assuming the pipe line is seven feet deep and at the time of the thaw or warm weather the covering has been frozen to a depth of six feet, which is quite common in the northwestern states and in Canada, between Lake Superior and the Rocky Mountains. It takes from six to eight weeks of spring weather in open country to thaw out the six feet of frozen ground. Therefore, while the thawing out is going on from the top, the frost is gradually radiating out of the frozen mass from the underside and before it is overtaken by the heat from the surface has penetrated another foot and caught the pipe line. Fortunately, pipe lines which freeze up after cold weather has ceased seldom burst, as the ice is honeycombed to some extent.

If trouble is anticipated, a condition as described can be overcome by pumping water through the line say, 30 minutes every morning and night. If the pipe line is three or four miles long, the time of pumping should be increased as it is of vital importance that enough water is pumped into the line to displace all of the ice cold water and to wear-off ice which might have formed on the pipe walls. In the case of town or city water mains there is no danger of freezing, providing a reasonable amount of water is passing through the mains, but dead ends should be given a good scouring out through the end hydrant at regular intervals, according to the size of pipe. If the pipe is not less than six inches in diameter, flushing once every two days should be sufficient.

Such Instances Do Occur

By H. P. Blake
Engineer Water Supply, Canadian National, Winnipeg, Man.

On this territory, where the temperature sometimes drops to 40 deg. below zero there have been instances of pipes freezing up during a thaw. The most recent was during May of last year. The pipe was eight feet below the surface and on digging down to learn the cause of the stoppage the ground, although free of frost for the first three feet, was found to be frozen solid to the pipe below. The pipe had been installed in light porous material which allowed the run-off, almost in the freezing condition, to seep through the cold and frozen stratum to the pipe below. If the pumping plant at this point had been in operation every day this trouble would not have occurred as the moving water would have kept the temperature of the earth around and over the pipe above the freezing point, but as the plant was only used three times each week it allowed sufficient time for the frost to do its work.

The kind of precautions required to prevent trouble at such times depends on the local conditions. Of the 600 water stations on my territory there has never been a pipe line frozen where the pumping plant was in daily operation, which suggests one way to avoid trouble. Another way would be to arrange the installation so that the discharge pipe could be drained after pumping, or if that is not possible, to adopt one of several methods of insulating the pipe, it being understood of course that whatever the method, the insulation or covering must be waterproof.

I have known of cinders and manure being placed over a pipe to prevent freezing but it has proved ineffective and expensive in the end because if the pipe has not been thoroughly coated with a good pitch-tar or other compound at the time of installation the nitric or sulphuric acids eventually wash down to the pipes and eat through them in no time. If the pipe cannot be drained or insulated as mentioned above, the water should be moved in the pipe daily, either by a short run of the pump or by making provision to let some water from the tank flow back through the discharge pipe to the source of supply.

Explaining it Scientifically

By D. D. Ewing
Professor of Electric Railway Engineering, Purdue University

It is an old and oft-quoted notion that warm weather drives the frost into the ground. It is a fact, however, that there is no repelling action between heat and cold as there is between the similar poles of a magnet. Instead the transmission of heat (or cold, which may be considered as negative heat) follows all of the laws of flow just as do water, compressed air, electricity, etc. Heat flows from an object of one temperature to another object of lower temperature. The rate of flow can be computed by multiplying the temperature difference of the two objects by the heat conductivity of the material separating the objects. Such a rate of flow is measured in heat units per second; the best known heat unit being the amount of heat necessary to raise one pound of water one degree Fahrenheit, which is known as the B. t. u. (British thermal unit).

In cold weather the surface of the ground is lower in temperature than that of the earth under the surface, with the result that heat flows from the ground to the surface. This flow diminishes the heat stored in the ground and, therefore, reduces its temperature. With continued cold weather this reduction in temperature may continue until the ground temperature is below the freezing point for a considerable depth and the soil becomes frozen. Obviously, all water pipes located in the low-temperature soil will be frozen unless heat is transmitted to them by permitting the water to flow or by some other means. With the sudden return of mild weather the surface of the ground is raised above freezing, and heat will flow from the surface to the frozen layer below. But heat will also continue to flow to this frozen layer from beneath. In time the frozen layer is thawed out,

but before this happens the abstraction of heat from the ground below may increase the depth of the frozen layer considerably over what it was at the beginning of the milder weather and thus freeze all pipes laying in this part of the soil.

Summing up, pipes are frozen after thaws because: (1), the precautions taken during cold weather are relaxed and (2), because of the progressive increase in the depth of the frozen ground layer.

The preventive, of course, is the same as the preventive of freezing at any time, i. e., by locating the pipes below the frost line, and, by maintaining the precautions which have prevented freezing in the cold weather for some time after the start of mild weather.

Raising Dirt Track

When should track forces begin to pick up dirt ballasted track in the spring? What is the danger, if any, to beginning too early?

Starting Too Early Will Make Conditions Worse

By F. T. Beckett

District Engineer Maintenance of Way, Chicago, Rock Island & Pacific, El Reno, Okla.

There is no fixed date when track forces should begin to pick up dirt ballasted track in the spring. It will vary in different territories and in different soils. Furthermore, different soils require different treatment.

Work of this character may be done to advantage as soon as sufficient dry material shows up so that the dry material may be handled. This should apply to what is commonly called "patch work." Surfacing the track out of face should not be commenced until after the frost is well out of the ground and the early spring rains have settled the surface.

The danger in beginning work too early is making bad conditions worse. The earliest work to be done is to see that the track is properly and thoroughly drained after which steps should be taken to pick up the loose dry dirt for spotting the track.

May is the Earliest Month

By H. R. Clarke

General Inspector Permanent Way, Chicago, Burlington & Quincy, Chicago

In attempting to discuss this question, I have consulted with three of our most experienced roadmasters, all of whom emphasize the fact that the method of doing the work is as important as the time and that the two should be considered together.

As the frost leaves the ground and the snow melts, dirt track generally becomes rough and it is necessary to smooth it up as quickly as possible. But even this first smoothing up should not be done until the dirt is reasonably dry. If conditions are such as to make it necessary, the track should be protected with slow orders until the dirt dries and in aggravated cases where such drying takes place slowly, a few cinders are usually available and should be used. Two or three cars of cinders carefully distributed, unloading a few shovelfulls here, a few yards in another place, will be of material help as a temporary measure until the dirt becomes dry enough to be worked. Every roadmaster handling dirt track should be given a few cars of cinders for this emergency use. It is important that the foreman take advantage of conditions on his section, working the driest spots first and moving ahead to others as fast as the dirt dries enough so that it does not "ball up" and stick.

The method of handling is as important as the time, and a point that must be watched, especially in the spring, in working dirt track, is to keep every spot and every tie that is worked over or disturbed, well filled in, dressed off and properly drained. Dirt track should not be left open for a possible rain to put it in an almost impassable condition, but each day's work and each little piece of track worked, must be properly filled in and finished before leaving it.

All ties should be tamped solid from the end of the tie up to and well under the rail and about 18 in. to 20 in. inside of the rail, blading the dirt under the tie in the foot or so left in the center, but not tamping hard. This prevents track from becoming center bound.

When filling in and dressing, the dirt should be tamped and packed solid between the ties and up to the top of the dressing. Cribbing should be done between the ties opened up under the rail and the dirt should be cut away from the end of the ties and a little below the bottom so that when the track settles the water can work out. It pays to pat down and smooth off the freshly disturbed dirt so that water will run off readily.

As a rule rains are quite frequent during April, at least in most of the Burlington territory, and it has been found advisable to postpone any out-of-face surfacing on dirt track until after May first. Previously, only that smoothing up is carried out which must be done and on some lines and in certain locations it has been found better to wait until about June first. It is also considered advisable not to work dirt track too late in the fall, but to stop any general raising early enough so that the track will have a chance to settle and become solid before snow and freezing set in.

Dirt track usually works better in the early part of the season, that is in May, June and July, than in August and September. The frost and spring rains leave the dirt mellow while later it dries out, bakes and becomes hard. This is important to keep in mind and justifies working track as early as dirt and climatic conditions allow.

The dangers of beginning to pick up and surface dirt track too early are: (1) The track cannot be worked to advantage or made to hold until the dirt is reasonably dry; (2) even if dirt is fairly dry when worked, a period of rains such as is common in the early months, will undo the work of days and weeks, the water soaking into the freshly worked dirt instead of running off and the track getting badly out of surface and line. These same dangers exist if track is worked too late in the fall, in territories where rains usually occur before the track freezes.

Driving Concrete Piles

What are the requirements of a pile follower and what precautions are necessary in driving to prevent shattering the tops of concrete piles?

A Cushion is Essential

By H. A. Gerst

Assistant Bridge Engineer, Great Northern, St. Paul, Minn.

The follower should be of strong timber, preferably of oak, with a steel plate bent cylindrical into a sleeve or thimble secured by through bolts to the lower end

of the timber follower. The bottom of the sleeve should be at least 1½ ft. below the bottom of the timber so that the sleeve will not come off the pile head in driving. A cushion made of old manila or hemp rope, old hose, etc., should be placed upon the top of the concrete pile before the follower is placed thereon. A flat steel plate may be placed between the cushion and the timber stick, which should be thoroughly bonded to prevent splitting. The purpose of the flat plate is to distribute the load over the cushion, although this is not entirely necessary if the timber stick is of full size and intact.

It may be of interest to know the dynamic effect of a hammer weight falling upon the pile without the use of a cushion and follower. With a 4500-lb. hammer falling 8 ft. and assuming a pile penetration of ½ in. the theoretical compressive stress in the pile amounts to 864,000 lb. For a 16-in. octagonal pile the resulting compression equals fully 4,000 lb. per sq. in., which is more than the crushing or compressive strength of ordinary good concrete. It is, apparent therefore, that the use of the cushion and follower is absolutely necessary if shattering of the pile is to be avoided.

Before starting to drive concrete piles it is good practice first to dig holes for each pile with a telegraph post auger, especially if in hard ground. The size of the auger should be a couple of inches smaller than the pile. When driving the pile in sand, a water jet directed along the sides of the pile will aid the sinking of the pile materially. In any event, the use of the water jet for lubricating the outside of the pile and the hole in the ground will make for easier driving and save the piles from unnecessary hammering, which tends to shatter or break the top, especially if driven slightly out of plumb.

A Special Driving Head for Concrete Piles

By F. H. Cramer
Assistant Bridge Engineer, Chicago, Burlington & Quincy, Chicago

The requirements of a pile follower depend to a great extent on local conditions and the kind of piling driven. The length in many cases is the governing factor, also the resistance to driving in various kinds of soil. A good, sound white oak pile of large diameter, properly ringed to bind the head of the pile, and the ordinary driving head at the other end makes a substantial follower. If a soft wood pile is used and if the driving is rather difficult the ends will broom quickly, necessitating the renewal of the pile or retrimming the ends. This performance several times a day will greatly delay the progress of the driving.

The driving of reinforced concrete piles requires extra precautions and the equipment must be of the proper requirements. Concrete piles can be driven with either a steam or a drop hammer. Experience on the Burlington has shown that a steam hammer equivalent to a Vulcan No. 2 gives the best results. With this type of hammer the piles are driven with less damage than with the drop hammer. In cases where it is necessary to use a drop hammer, the drop should not be greater than necessary to get the penetration. If the fall of the hammer is increased, the damage to the pile is greatly increased.

Concrete will not stand the impact of the hammer as well as wood. Therefore, it is necessary to protect the top of the concrete pile by using a special driving head, made either of steel or cast iron. The recess for the head of the pile should be large enough to receive the full top of the pile and the cushion. The cushion is made of one or more layers of plank, frayed rope or worn out brake hose. This type of cushion will protect the pile head from spalling except where conditions are severe. In case the pile does begin to spall, the damaged portion of the pile should be cut off as level as possible, including the reinforcement, and then the driving can proceed.

Manila Rope Makes a Good Cushion

By C. C. Westfall
Engineer of Bridges, Illinois Central, Chicago

In driving concrete piles in trestles under traffic, it is necessary to use both a follower and a cushion. The follower makes it possible to drive the pile so that the top reaches the proper elevation, thus avoiding a waste of piling which would be experienced where it is necessary to stop the top of the pile at the bridge deck. The cushion is necessary to furnish a uniform bearing over the head of the pile for the hammer. It is practically an impossibility to have the head of a pile exactly level and parallel with the striking plate of the hammer and without a cushion, the pile head would generally be seriously shattered. A satisfactory cushion can be made of old Manila rope.

The essential precautions when driving concrete piles are the use of an efficient cushion and the holding of the pile and the hammer in a plumb position. Where the follower is not necessary for the purpose of obtaining penetration and where the pile and the hammer can be held plumb without the follower and proper provision for the cushion is made, it does not seem necessary to use a follower in driving concrete piles.

Enlisting Young Men in Track Work

What inducement can a section foreman offer young men in his community to enter track work?

A Foreman That Men Like is Half the Battle

By William Shea
General Roadmaster, Chicago, Milwaukee & St. Paul, Chicago

Answering the question in the fewest words, the best inducement that a foreman can offer the boys of his community is for him to offer them an example in himself by his own actions as section foreman in his own home, and among his friends in his home town while off duty, where he should be known as a "Good American."

On the Chicago, Milwaukee & St. Paul, an effort is also made to point out to young men the many benefits in store for them in track work. Much time and money has been spent in following out suggestions by many railroad men as to how to get the question before them, and with more or less success.

A roadmaster may say, "What can I do?" He can at least select a foreman who will be a credit to himself and family as well as the company, and who will stand so high socially, morally, and otherwise that he will be an incentive for young men of his community to aspire to this position. Many times I have been in towns of 800 to 1000 inhibitants, where there were high-class young men who should have been working for us on the track, and who would have entered the service of the company on the track, but for the failure of the roadmaster to have concerned himself enough to have placed a high-class foreman in charge of the

section there so that the boys in the community would be able at least to meet a man that would appeal to them.

There Are Plenty of Inducements

By Eric Sanberg
Roadmaster, Great Northern, Conrad, Mont.

When the Apostle Paul wrote, centuries ago, "You are living witnesses set before many men," he must have been thinking of the track foremen. What a foreman can show, what he has accomplished, and what standing he has in his community, are important factors in getting young men to enter track work.

Young men sometimes feel that they have to wait too long on a section for a steady job, and that if they can't get winter work, a few summer months' work will not be enough to carry them through the year. There is a great deal of truth in this, especially in later years when track forces are smaller than ever before. But if a man gets a couple of years' summer work, he can be pretty sure of getting winter work somewhere and need not wait very long until he can get a section, providing he is the right kind of a man for that business. In this territory the wages compare favorably with any other line of work. Furthermore, the motor car has robbed the section work of its hardest work—pumping the hand car—and the actual working hours are short. Also, after a man has acquired seniority rights there are pass privileges for himself and family which amount to quite a little. All these are inducements.

The Track is the Best Stepping Stone to Something Better

By James Sweeney
Supervisor, Chicago & Eastern Illinois, Danville, Ill.

In the past the inducements for getting young men to enter track work were not very enticing, but with wages at their present standard I do not believe many boys, just out of high school, can do much better than to get the wages of a section laborer, no matter where they start. Of course, there is a prejudice in the minds of most young men against anything that is known as common labor but for the boy who wants a knowledge of the railroad business, I know of no place where the future rewards will be any greater.

If he comes to us at the age of 18 he should be a foreman at 21. In those three years he can learn more about the actual physical operation of a railroad than he could possibly have learned in any other position. If he decides to market his experience in other departments he will find little difficulty in doing so. But suppose he does not want to go into another department. The field is not limited and the way is not as long as it might seem if he will do all he can to get ready for the opportunities before the opportunities are ready and waiting for him. The road is laid out and the stations are charted. The chart that he must follow reads, roadmaster, trainmaster, superintendent, general manager and vice-president of transportation. We have to admit that all these offices are still in existence and men are not chosen to fill them because they have curly hair or some fashionable shade of eyes. There is a standard of measure for positions of that class as fixed as the length of a mile and that measure is a knowledge of transportation and the ability to handle men. Whether this boy can leap all the hurdles that will confront him, may be improbable but it is not impossible for it is being done every day.

The section foreman must remember that it is not the foreman who has this future to offer but that it is the railroad system as a whole. It is not a one-sided question by any means and from the first day the young man comes to the railroad with his question of what the railroad has to offer the railroad is asking him, "What have you to offer?"

Maintaining Gage at Crossings

What measures should be taken to maintain the gage at railway crossings?

See That Frogs Are Full Gage

By J. B. Martin
General Inspector of Track, New York Central, Lines West, Cleveland, Ohio

The solution of this problem involves both the manufacture and maintenance of the crossing frogs. In some instances the gage is tight when the frogs come from the shop. Care should therefore be exercised to see that they are full gage, also that all castings and filler blocks are of the proper size and of such quality that they will not wear excessively under traffic.

The tightening of the gage after the installation of frogs largely results from the wear of the castings, which is taken up when the bolts are tightened, also from poor alinement caused by rail creeping. To prevent the excessive wear, crossings should be maintained in good surface and all bolts should be kept tight at all times. To preserve the alinement, all tracks should be sufficiently ciently anchored.

The Manufacturer Can Help

By E. D. Swift
Engineer Maintenance of Way, Belt Railway of Chicago

It has been my opinion that a solution of the problem of maintaining the gage at railway crossings rests with the manufacturers in providing extra width of gage in the crossings when they are made, the thought being that an extra width of say ¼ in. in the gage is less objectionable than a gage less than standard, and that any change from the conditions established in the new crossing would be towards the normal condition instead of away from it. An objection of the manufacturers is that special fillers would be required which it would be difficult to make of rolled steel unless a considerable demand would develop for them. In view of this objection the problem might be handled by the use of liners between the fillers and the rails to compensate for the metal that has been worn away. This method has been used on the Belt railway in a few instances by placing cut steel washers between the fillers and the rails.

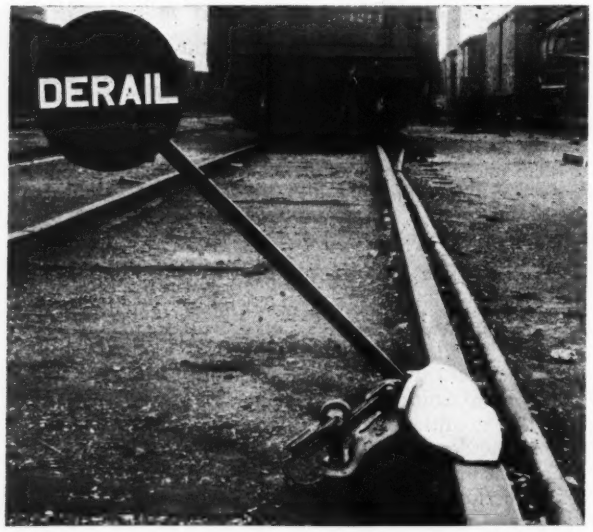
It seems probable that the conditions of gage as established in the manufacture of crossings might be made more lasting by machining the contact surfaces of the fillers and rails so as to remove slight imperfections of the surfaces, including scale, etc., which are present to a greater or less extent as the rails come from the rolls, and which are worn away or broken loose early in the life of the crossing. The condition is like that which is found in the contact surfaces of angle bars and rails where experience shows that looseness of parts develops soon after installation, caused by the early wearing away of the irregularities in the contact surfaces.

Getting the Manufacturers' Help

The Year's Developments in Labor Saving Appliances

A Portable Derail

THE HAYES Track Appliance Company, Richmond, Ind., has just developed and is now introducing an addition to its line of derails in the form of a portable derail for use in protecting camp cars, car repair tracks, etc. This derail, which is known as Model FB, is a



A Right Hand Portable Derail in Position With Staff and Blue Vane

portable device weighing 33 lb. and resembles the regular Hayes derailing equipment with the exceptions of its light weight and portable character as required in the service for which it has been especially designed.

An attractive feature of the device is that no tools are needed to install it securely against dislodgment. This is accomplished through the agency of a lip on the head of the derail or rail block which fits over the outside of the rail head and a cam on the underside of the derail casting which is forced against the web of the rail and under the rail head on the inside of the rail in the following manner: The derail casting is first placed in position, on the head of the rail with the casting extending towards the center of the track and resting on a tie. In the heel of this casting is an eye-bolt which is turned to lower or raise the derail casting until the head block lies flush on the rail head. Up to this time the cam hangs loosely under the derail casting from the end of the locking bar or handle. The next motion involved is to bring this cam in contact with the rail, which is done by shoving the vertical bar which holds it, from a low position on the derail casting to the high position next to the rail. Turning this bar by means of the lever bolted to it forces the cam against the head so that the derail cannot be removed until desired, as well as securing the derail against sliding along the rail.

A padlock is provided with this derail for the purpose of securing the casting from removal by manual means. This padlocking is accomplished by bringing the derail locking bar around to a position where the slotted lever can be dropped over the head of the eye-bolt when the padlock can be inserted. While some back turning of the derail locking bar may be required to bring the lever in position for padlocking, a spring provided on the locking cam is sufficient to maintain the desired pressure against the rail.

The device is suited to application on any rail from four to six inches high and is made in right and left hand models for derailing cars to the right or to the left of the track. A blue vane with staff fitting in the socket in the derail block and having a lantern hook attached is also furnished when desired. This vane can be painted to carry whatever warning is specified.

A New Development in Culvert Pipe

THE MOST recent development in culvert pipe is a cast iron pipe provided with corrugations like rolled iron or steel pipe except that the corrugations are formed in a spiral like a screw. The object of this spiral corrugation is two fold, first, to afford greater strength than can be had with smooth pipes of the same thickness and, second, to provide a convenient

How the Pipes Are Assembled

and ingenious method of holding sections of pipe together as made up to form a culvert. This pipe is manufactured in four sizes, 18, 24, 30 and 36 in. in diameter. The sections are made 3 ft. 3 in. long and each diameter of pipe is furnished in equal numbers of two styles of members, a pipe member and a cuff member, the latter being just enough larger than the pipe member to permit the former to be screwed into it. The manufacturer recommends that the members be screwed together one complete turn, this being enough to hold pipe against separation but allowing considerable flexibility in the joint. As a result a 36-in. pipe may be deflected 4 in. from the tangent line in the length of one section. This flexibility is of considerable advantage in laying the pipe on uneven ground or with a crown at the center to compensate for settlement. This pipe is manufactured by the American Castings Company, Birmingham, Ala.

A Three-Man Inspection Car Balanced for One Man

ONE OF the problems which has confronted manufacturers of motor cars since the demand arose for a center load type of car for inspection purposes has been that of building a car which would carry several men comfortably, but which at the same time would not be too heavy to be handled by one man. To meet this demand, Mudge & Company, Chicago, is now introducing a car which provides ample capacity for three passengers and which is suited at the same time for use by a single operator travelling alone.

An important feature of the car is the cross arrangement of the seats in front which is a departure from the familiar type of construction for center load cars of having but one seat extending through the center of the car. The construction enables the men seated on the front to face in the direction in which the car is running, thus facilitating inspection and keeping the men constantly alert to dangers ahead. At the same time the operator of the car also obtains an unobstructed view of the track ahead and is provided with ample space with which to operate the car and carry his tool kit, etc.

The ability of one man to lift this car on and off the track results from the provision of extension lift handles which are pulled out to the rear of the car when desired, where they resemble the handles of a wheelbarrow. This gives the man more leverage for lifting than is obtaind where the handles are close to the car frame.

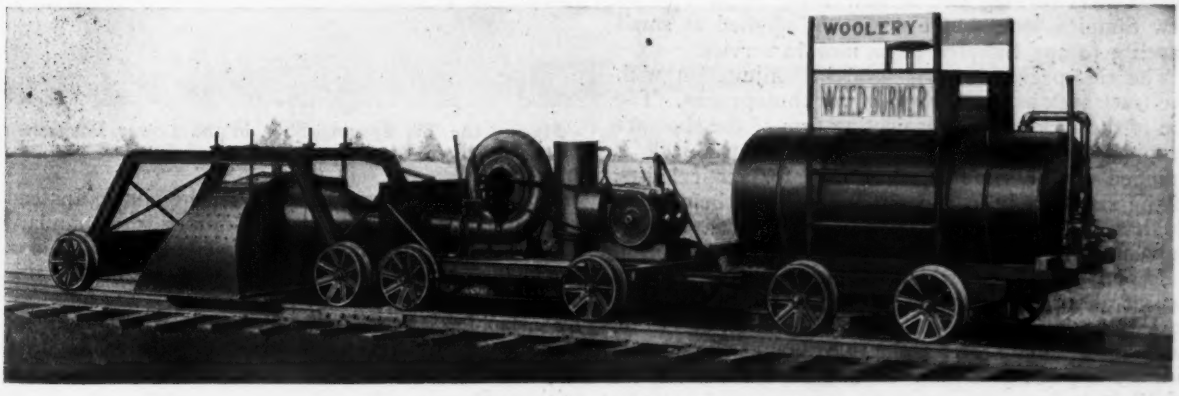
The frame construction of the car is designed to prevent any overload being transmitted to the center bearings of the drive axle, which is a protection from broken axles. This frame is made of selected maple to secure adequate strength. The power equipment consists of the Mudge standard Class E engine with a Wico magneto or battery ignition where the latter is desired. The method of transmission is through a

The New Inspection Car Being Lifted from the Track.

set of machine-cut and heat-treated gears having a ratio of 1¼ to 1, which increases the power and cuts down the speed of the car. Hyatt roller bearings are used on all four axles and the car is further equipped with a safety railing across the front and a deep box deck on the front end which prevents tools from falling into the wheels or off the car. Constructed in this manner the car is adapted for general inspection use by roadmasters, supervisors, signal maintainers, telegraph linemen, etc.

A Motor Car Operated Weed Burner

AMONG THE developments of the last year made with a view to permitting maintenance work to be done with less labor and cost than has been required with other methods or equipment, is a weed burner which is installed on a motor car instead of requiring the service of a locomotive, as is customary with the usual type of weed burning equipment. The apparatus consists of a large steel hood which is suspended over the track from a structural steel frame, the forward end of which is carried on motor car wheels ahead of



A Side View of the Woolery Weed Burning Outfit

the hood while the rear end is carried on a bulkhead built up from the forward end of a specially constructed motor car. This motor car is built of structural steel members and carries, in addition to a 10 hp. gasoline engine, a large blower fan connected up in such a way as to atomize the oil and force the flame in a hot blast against the hood. This hood has a width equal to approximately the length of the tie and is so shaped as to reflect the heat downward against the grass.

The burner is designed to use distillate oil or kerosene as fuel, which is carried in a 500 gal. tank on a separate car, trailing the burner car at a suitable distance. This tank is equipped with a double-acting pump for filling purposes and is surmounted by a platform from which the driver operates the burner. The motor car engine also drives the blower fan.

This outfit is accompanied by two men, including the driver, and operates at a speed of from 1 to 3 miles per hour when burning weeds or from 15 to 20 miles per hour when traveling from place to place. The fire starts instantly when the fuel is turned on and a torch applied, while the flame may be shut off when crossing bridges without the necessity of relighting it by hand when the fuel is again turned on. The operator extinguishes the flame by closing a gate valve, the opening of which re-establishes the flame without disturbing the fuel adjustment, which is controlled by a separate regulating valve, all accessible from the driver's seat on the fuel car through suitable control levers.

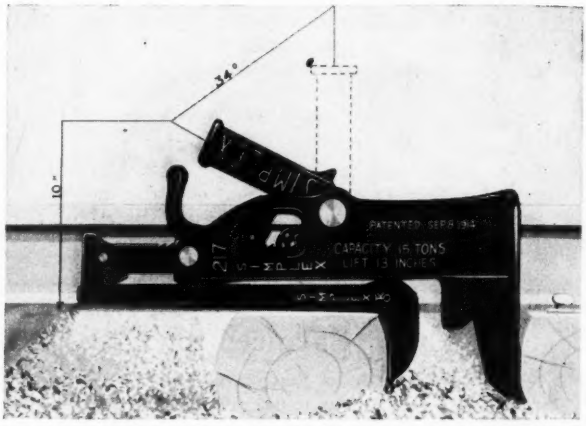
This outfit is a development of the Woolery Machine Company, Minneapolis, Minn., and has already been tried out on the Great Northern and other western railroads where the machine is reported to have burned weeds at about one-fifth the cost with a locomotive weed burner.

Simple Device Converts Track Jack Into an Effective Track Spacer

BY SUPPLYING a simple steel member which may be quickly attached to or removed from the Simplex track jack manufactured by Templeton Kenly & Co., Ltd., Chicago, the jack may be converted immediately into a tie-spacer whenever work of this kind is to be done. This added member, which is known as a tie spacing shoe, is an L-shaped steel forging which is attached to the cap on the jack rack by means of an ingenious groove and pintel arrangement. The cap for the attachment of the tie spacing shoe is especially designed for this purpose, and is also a steel forging and is now being applied to all new Simplex jacks but can also be applied at small expense to any Simplex jacks now in service.

The tie spacing shoe is used in conjunction with the track jack as shown in the two photographs. The toe of the jack and the projecting arm of the shoe are dropped between the ties, after which the jack is pumped up the same as when used for vertical lifts. If the rack has been run out to the limit before the tie has been moved the desired amount, a further movement can be obtained by attaching the shoe in a second position, in which case it is engaged by the cap at about half way of its length, after which the rack is again run out. As the lift of the jack is 13 in. and the distance between the two shoe connections is 6 in. it is possible to shift a tie a maximum distance of 19 in.

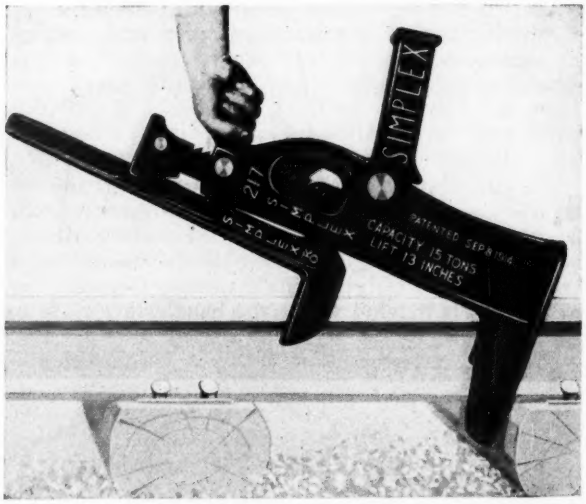
To shift a tie by any method it is necessary to remove the ballast on the side of the tie toward which it is to be moved. However, in case any number of ties are to be moved, and the work is to be done by jacks equipped with tie spacing shoes it is necessary to crib out only in front of the first tie, as experience has shown that the following ties may be moved over



The Jack with the Tie Spacer Shoe in Place

without removing the ballast in front of them. It is also said that the use of the jacks for tie spacing does not tend to hump the track. As the projecting face of the shoe is 3½ in. deep by 3 in. wide, thus affording a bearing area of 10½ in. on a sawed tie, the ties are not crushed or bruised by the shoe in tie-spacing operations.

Attention has been directed to the fact that the tie-spacing shoe is not an added appliance designed for highly specialized purpose for which it can be used

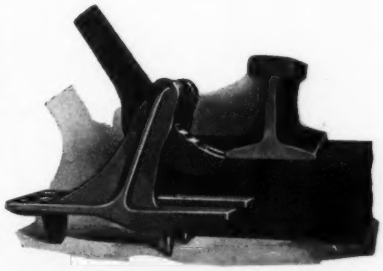


Placing the Tie Spacing Shoe in the Lower Position Allows the Tie to Be Pushed Further

only relatively a small portion of the time. Instead it should be considered as an adjunct to a standard tool whereby the standard equipment is afforded a certain added usefulness. A further feature of this appliance to which attention is drawn is the fact that by attaching the shoe to the jack when used for vertical lifts it affords a means of lifting the load higher above the base of the jack than is possible without it.

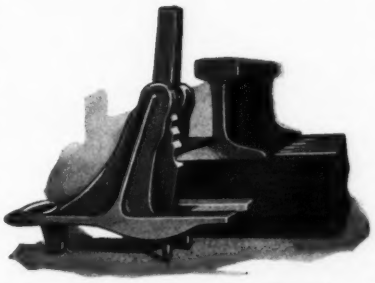
A Lighter Weight Track Liner

THE LATEST development in substituting mechanical devices for the ordinary lining bar in track shifting work is a device which claims recognition by virtue of being 11 lb. or one-third less in weight than the lightest equipment produced thus far and also because of its adaptability for raising joints, spacing ties and other uses.



The Type B Liner with the Claw Bar for Lifting Work

The distinctive feature of the device from a structural and operating standpoint is that instead of using the lining bar only as a handle for operating the device, it is still the lining bar that actually shifts the track. The only difference from the original operation of lining is that a fulcrum is provided whereby the shifting is accomplished by bearing down on the lining bar instead of pulling up upon it. This fulcrum is a casting having a base 6½ in. wide and 14 in. long with lugs on the bottom to prevent slipping under load and two arms extending upwards on an incline to a total height of eight inches. These two arms are separated sufficiently to permit a lining bar to fit between them and near the top are two sockets, stepped one above the other, for holding a special make of lining bar which is required.



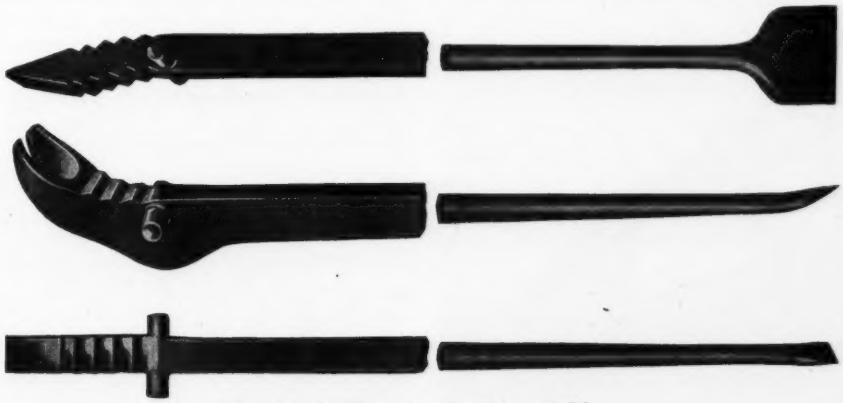
The Hackman Type B Liner Equipped for Lining Track

The special lining bar differs from the ordinary bar only in minor details. It has lugs one inch long on each side near the point to fit into the sockets in the casting. A series of notches are also provided above the chisel point as a protection against slipping when pressing against the rail base, and a slight bend is given the end of the bar which fits the bar better for lining than if it were straight. This bend is also an advantage in "nipping up" ties when driving spikes because it provides a heel for leverage, although this feature, of course, is not involved in work for which the bar is especially designed.

The lining operation consists of placing the casting in position on the ballast between the ties and against the rail base, inserting the lugs of the lining bar in the lower sockets of the casting and pulling back on the end bar. In this manner, it is claimed, a track can be shifted from one to two inches without any raising whatever, whereupon an additional shifting of approximately the same amount can be made without raising the track and without changing the position of the base by raising the lining bar out of the lower sockets and dropping it in the higher sockets.

In addition to providing a lining bar with a chisel end, a lining bar with a tamping bar end has been designed for use with this base, also a claw bar with a chisel end, thus affording a combination of tools sufficient, with a track shovel, for three men to do ordinary spot surfacing and lining work. The claw bar is of value in raising low joints, which is done by inserting the claw bar in the lower sockets and placing the liner base a sufficient distance out from the rail to produce a lifting movement instead of the horizontal thrust that results when the base is against the rail and the lining bar is used.

In addition to raising low joints the device is suited to spot surfacing and to some extent for tie spacing. It has also proved effective in gaging railway crossings, which is done by setting a liner at each end of the portion of rail to be gaged to hold the track in place while two liners are set up between the first two and pressure applied in the opposite direction to force the track in position. The device is also adapted for a variety of work constantly confronting track and bridge and building forces, such as the slight raising of timber or similar loads where a fulcrum is desired which is proof against sinking into the ground or slipping under the load and causing accidents. Since the casting weighs only 19 lb. the tool reduces the load on a track man to the point where other tools can be carried at the same time. Attention is also directed to the value of the casting from a safety standpoint by virtue of the low height which permits of its being left in place in the track without causing a derailment.



The Special Bars for the Type B Liner

The device has been subjected to trials on the Illinois Central and the Gulf lines of the Atchison, Topeka & Santa Fe. In a test in the Hawthorne yards of the Illinois Central in Chicago, 500 ft. of new yard track which was filled solid to the top of ties with

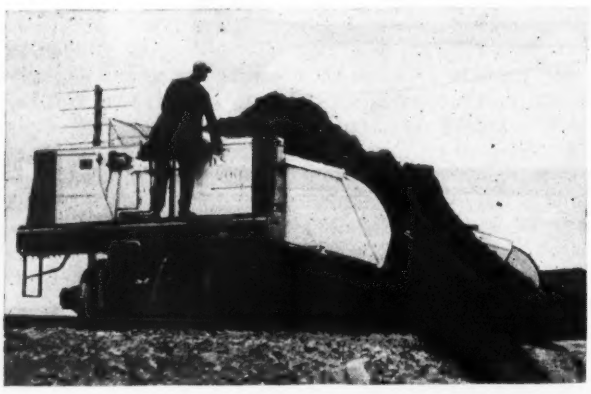
cinder ballast was lined a maximum of two inches by three men with three liners in 30 min., or at the expenditure of 1½ man hours, as compared with the time of 15 men for three hours, or an expenditure of 45 man hours, which the roadmaster reported would have been required if ordinary lining bars had been relied upon. No digging of the ballast preparatory to the shifting was required.

The new lining outfit is being introduced by the newly incorporated Hackman Track Liner Company, Chicago, and will be known as the Hackman Type B track liner, to distinguish it from the Idol track liner, an earlier invention of F. Hackman, which is being manufactured by the Idol Track Liner Company. The bars used are of Verona make.

A Side Dumping Car for Partial as Well as Full Dumping

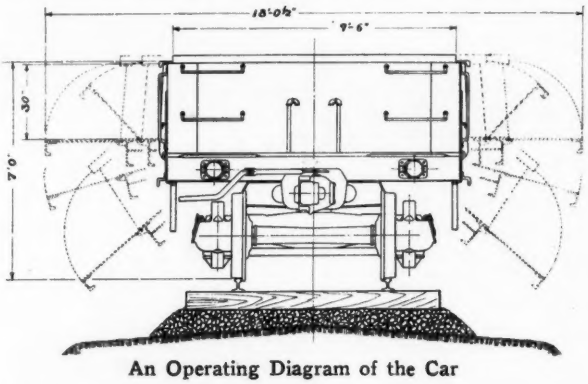
TESTS, which are reported as having been entirely favorable, have been conducted recently on the Great Northern and the Detroit, Toledo & Ironton with an automatic air-operated side dump car which differs in a number of details from equipment of this character in use on railway work at the present time. Prominent among these features is a form of construction adapted especially to partial dumping as well as to full dumping at any point on either side.

This car is known as the Differential Air Dump Car and is built with a capacity of 100,000 lb. or 28 cu. yd. when level full or 43 cu. yd. when the load is heaped as in usual practice. Each car is 40 ft. 5 in. long and consists essentially of a steel underframe of the central girder type with stationary bulkheads at each end above the sill, between which is a steel body which may be tipped by compressed air and shifted properly to dump to either side. The body is supported on two lines of rollers spaced on two foot centers at seven foot intervals in the length of the car, which rollers operate in raised sections of the floor, a construction which also increases the strength of the car under load and protects the operating mechanism from damage as well as facilitating the shifting of the body laterally when being dumped. The dumping mechanism consists of an air motor operating through a worm gear reduction, all enclosed in an oil-tight case, and operated through valves on each car or from a central point in a train of cars. With this equipment, it is said, a car or a train of cars can be dumped to either side and righted in less than a minute.



A View of the Differential Air Dump Car in the Dumping Position Showing the Extended Floor Formed by the Car Side

The construction is such that any car may be locked so that it will not be dumped while other cars are being dumped. It is also possible for an operator standing on one end of a string of cars in a train to dump one series of cars in the train in one direction while another series is dumped in the opposite direction. The mechanism is also such that only part of the load may be discharged, by reason of the fact that the body is under control of the operator at all times and can be held at any angle of tilting desired. This facilitates the distribution of material when and where required. In dumping, the side of the car takes such a position as to serve as an extension of the floor on the dumping side, which arrangement makes it possible to dump the material clear of the ballast shoulder, a feature which is of value where it is desired to avoid fouling clean ballast or clearing the material away by hand labor.



An Operating Diagram of the Car

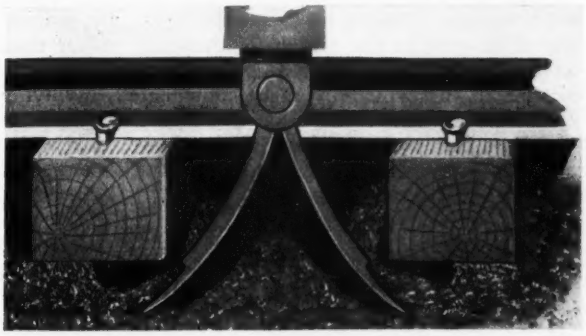
General features of the car include the unusually low height for the capacity, the height of floor being only seven feet from the rail to the top of the sideboard, which gives added stability to the car, facilitates dumping operations where a locomotive crane is involved and contributes, with the variable slope of floor, to render hand loading convenient. The car is also adapted to operation by unskilled labor with safety and is protected from accidental dumping by a mechanical interlock which keys the body to the underframe. This type of car has been developed and is being manufactured by the Differential Steel Car Company, Findlay, Ohio.

The Latest Development in Power Tamping Equipment

THAT THE tendency in labor saving devices is toward the introduction of larger machines for the conduct of operations now requiring the employment of men in considerable numbers is indicated by the development of a ballasting machine designed to take the place of a considerable number of men in raising tracks out of face. It is known as the Jackson track ballaster and is manufactured by the Electric Tamper & Equipment Company, Chicago. It is intended for use in ballasting track where the lift is from 3 in. to 12 in. The distinct departure in this machine lies in the fact that the use of mechanical power is effected without employing men to hold or direct the power tools as is the case of the tampers now in use. However, the originators of this machine do not advance it as a substitute for the power tamper

as it is not intended for ordinary surfacing work but for use in special service on heavy ballast raises.

The machine operates on the principle of a heavy drop hammer or pile driver, a blow being delivered by a cross head or drop hammer, the weight of which



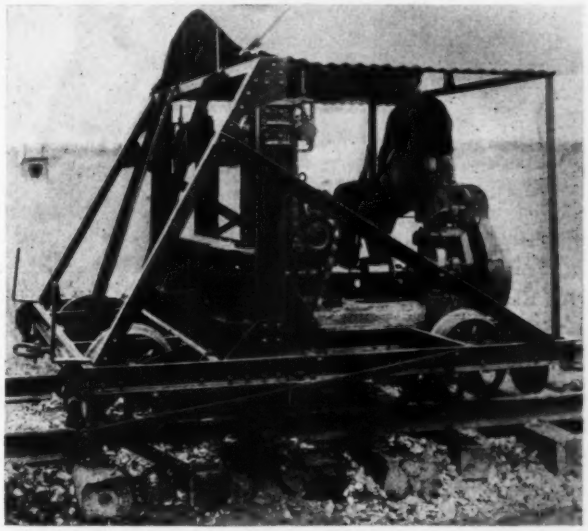
The Type of Tamping Shoes Used for Cinders or Other Soft Ballast

may be varied from 1,200 to 2,000 lb. The cross head, which extends the full length of a tie, operates in vertical guides mounted upon a specially constructed truck. The lower portion of this cross head carries four pairs of heavy hinged steel tamping shoes which transmit the blow to the ballast in an oblique direction under the tie. One pair of shoes operates on the outside and another on the inside of each rail. When the blow is delivered by dropping the cross head, the shoes of each pair upon coming into contact with the ballast, tend to spread apart, following a path of least resistance, which is the void under the ties. By this means the ballast ahead of each shoe is driven directly under the entire length of two adacent ties at the same time. When the tie is completely tamped the shoe will no longer penetrate under it but upon delivery of the blow will remain on top of the ballast, thus indicating that the space under the tie is completely filled. For a six-inch lift an average of three blows for each pair of ties is usually sufficient.

About 30 blows per minute are delivered by the machine, the cross head elevating mechanism being operated by a five-horsepower, air-cooled gasoline engine. The truck is moved from tie to tie by means of a lever, about five seconds being required to make the shift. Aligning clamps are provided which center the cross head automatically between each pair of ties. In case the track spikes are loose these clamps prevent any movement of the tie while being tamped.

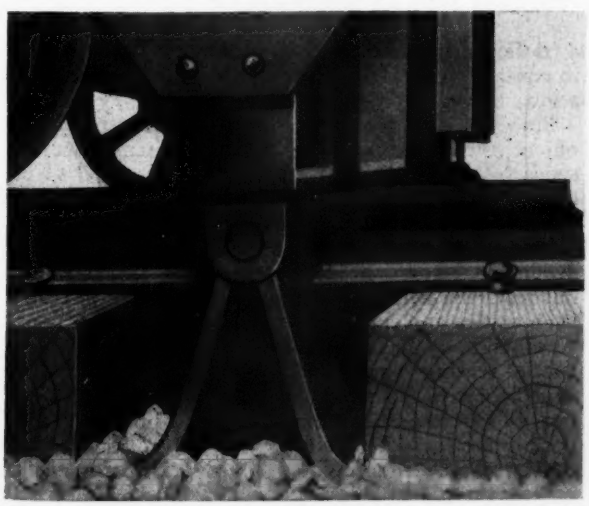
Where the space between the ties is filled with old solidified ballast, particularly cinders, sand or chatts and a lift of over three inches is to be made, shoes with a cutting blade are utilized. The action of shearing through the old ballast and forcing it beneath the tie is illustrated in one of the illustrations.

The machine represents the result of several years of experimentation and has been subjected to service use on the tracks of one railroad. It is operated by one man aided by two men with ballast forks to take



Tests of the Machine Demonstrate That Wide Variations in the Sizes of the Ties Do Not Interfere with Its Effective Use

care of any uneven distribution of the ballast ahead of the machine. With these three men it is said the ballaster will replace all of the men ordinarily employed behind the jack with tamping picks, shovels or bars for placing the ballast under the ties to make the initial raise and that the work performed is equal to if not better than that performed by hand labor.



After the Ties Are Tamped the Shoes Ride on Top of the Ballast

The Gardner Duplex Pump Improved

THE Gardner Governor Co., Quincy, Ill., has made important improvements in its duplex pump by replacing the open frame construction of the power end of these pumps with a power end of an enclosed type. From the standpoint of operation the principal change resulting from this remodeling is in the lubrication, all lubrication of the power end having been accomplished previously through a collection of grease cups attached to both the stationary and moving parts, while the new system is similar to that followed in the operation of more modern types of internal combustion engines where the crank shaft is lubricated by repeatedly splashing through an oil bath provided in the enclosure.

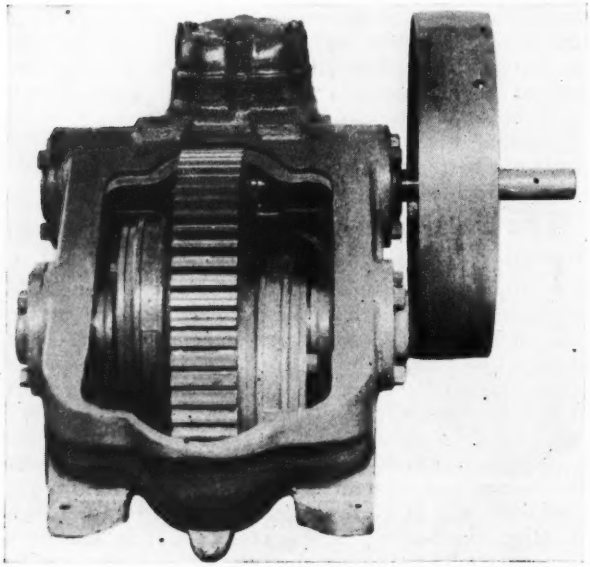
In adapting the pumps to this form of lubrication it was necessary to make radical changes in the design of the power end, distinctive features of which are the position of the drive gear and pinion which are now situated midway between the two pistons instead of on the ends of the crank shaft and drive shaft, respec-

tively, and also in the transmission of the power to the piston which, in the new pump, is accomplished by means of slip rings or eccentrics attached to a straight shaft in place of the crank construction of the shaft of the older designs of pumps.

This change has proved to economize lubrication

An Exterior View of a 5¾-in. by 6-in. Duplex Dump with Electric Motor Drive

but its merit from a railway standpoint is chiefly in adapting the pump more directly to those installations where little attention can be given to the pumping machinery. Since the drive gear and pinions, as well as the bearings on the crank shaft of the open frame construction are exposed to the moist air in pits or over wells and to splashing or dripping water and dust, considerable attention is required to keep the grease cups well filled and all working parts clean and in working order. The necessity for this atten-



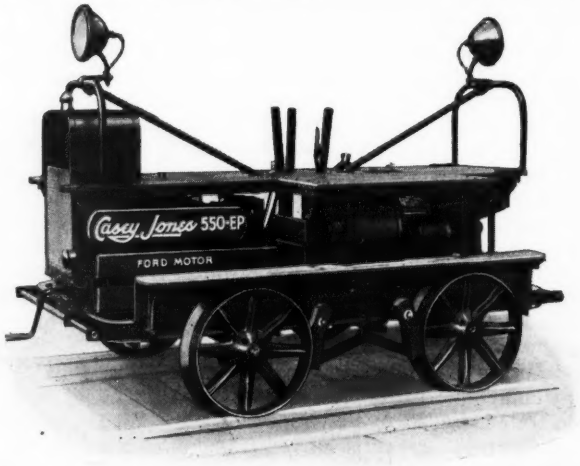
The Power End with the Cover Removed

tion is largely eliminated when the parts are enclosed and constantly splashing in oil. The effect is to make the pump particularly adapted for electric drive at points controlled by remote switches.

This form of construction also makes the pump more desirable from a safety standpoint in view of the tendency with the former type of pumps for operators to regulate grease cups while the machinery is in motion. The wear and tear as well as the accompanying noise encountered in operating the older type of pump, particularly at points of heavy service, has been largely avoided in the new design by placing the drive gear at the middle of the shaft rather than at one end. Except for this change the pump is similar to the type previously constructed, involving two pistons which operate on the double-acting principle and being adapted for pumping hot or cold water against variable heads suctions with direct-connected electric belt or gear drive.

Addition of Electric Generator Makes Motor Car More Useful

ABOUT a year ago the Northwestern Motor Car Company, Eau Claire, Wis., began the manufacture of a heavy duty motor car which was equipped with a Ford automobile engine. As described in *Railway Engineering and Maintenance* for January, 1924, this engine, the Casey Jones 550, is mounted on an all-steel channel iron frame and has a radiator, ignition and foot pedals and other equipment of the Ford automobile with the principal exception of the transmission,



The Casey Jones 550 E. P. Motor Car and Generating Set

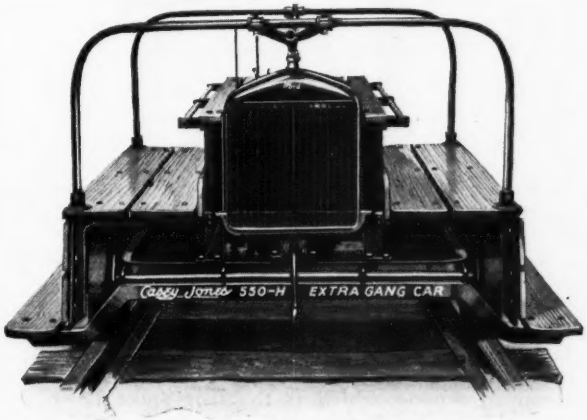
a friction drive accomplished by forcing a friction disc in contact with a friction wheel being used instead of a gear drive.

Since its introduction this car has become a larger object of interest through the development of several types of bodies, the object of which has been to enhance the versatility of the chassis unit. Thus, in addition to the body which provides the standard center load seating for motor cars, a body has been developed which has a floor extending several inches out from the wheels at each side for hauling material, such as ties and timber greater in length than the car. Another body has been developed which provides a special seating arrangement for large crews consisting of a floor which serves as the seating space and foot boards on either side so situated and protected as to permit the legs of passengers to hang over the sides of the car with safety. A third body provides an enclosed top with an adjustable windshield on both ends and folding side curtains, which, with the further equipment of a standard Ford starter, generator and

battery and lighting system, presents a combination of features which makes the car adaptable for official inspection purposes or where the unit is to be used as a rail tractor for hauling other cars.

The Standard Casey Jones Car with the Enclosed Body

A more unique development than this now presents itself, however, in the form of a special unit which carries a 7½ kw. generator. This generator is installed on the rear of the chassis at one side of the transmission and is driven by means of a six inch leather belt from a pulley placed on the drive shaft of the Ford motor. While primarily designed for operating the electric tamper equipment manufactured by the Electric Tamper & Equipment Company, Chicago, the entire unit is adapted equally well for operating electric track saws, electric track drills, floodlights and other electric devices which are growing in use in railway maintenance. While no tests have as yet been carried out with the car in tunnel lighting work the results obtained from it thus far are indicative that the

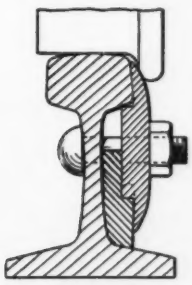


The Gang Car with the Foot Boards

equipment is also well adapted for this work, especially in view of the many other functions of the car, aside from that of lighting. The equipment is still within the limits of operation by one man, who can also turn the car alone by using a specially constructed turntable which is collapsible for carrying on the running board of the car while traveling from place to place.

New Switch Point Protector Gives Double Service Life

EARLY IN 1923 wide interest was attracted by the introduction of the Mack switch point protector. This is a small manganese steel casting in the form of a shield which is bolted to the inside of the stock rail just ahead of the switch point where it effects the necessary deflection of wheel flanges to prevent their striking the end of the switch point. Experience in the use of this device for two years previous to its formal introduction on the market and on a considerable number of roads in various parts of the country since that time has shown that it is responsible for a marked increase in the life of switch rails. The results have been carefully watched by representatives of J. R. Fleming & Sons., Inc., Scranton, Pa., the manufacturers of the protector, who have also studied the service rendered by the protector itself with the result that an improvement in this device has been worked out whereby the protector may be made to give twice the service of the original design with practically no increase in the amount of material required.



How the Protector Is Installed

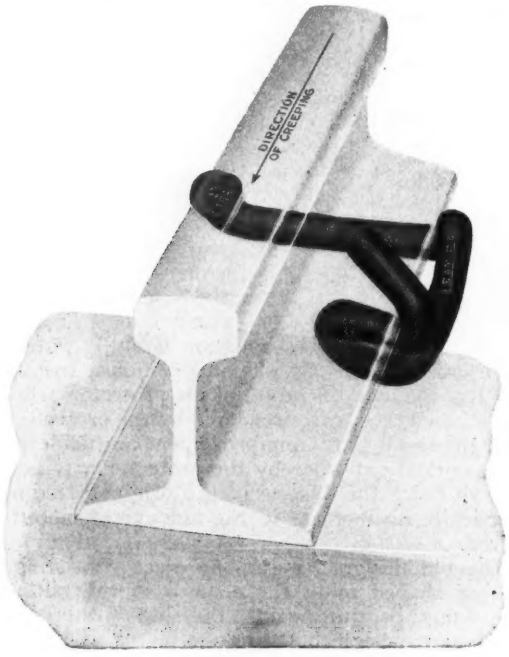
The old design was in one piece consisting of a casting shaped to fit the contour of the rail with a thin flange bearing against the side of the rail head. In the new design there are two pieces. One of these is a double flanged wearing member of symmetrical outline, one flange of which is placed against the side of the head of the rail, while the other bears against the second casting which fits against the web of the rail and a portion of the lower fishing surface. This arrangement is made clear in the cross section showing the device in position against the rail, which also shows that the wearing member has been made reversible. After the flange first placed against the rail head has been worn the wearing member can be reversed so as to place the other flange in the wearing position and thus secure an equal amount of service from that also. Moreover, when both flanges of the wearing member have rendered their full service, this member may be replaced without renewing the other casting.

The Weston Rail Anchor

SIMPLICITY of application and proof against overdriving are points which stand out prominently among the claims advanced for the Weston rail anchor which is now said to be in service on 14 of the larger railroads. This anchor is made of ⅞-in. round steel, heat treated and bent in such a manner as to make a one-piece article which can be applied and removed without any other tool than the sledge or spike maul which it is customary for the track man to carry.

Application is accomplished by slipping the hook end of the anchor over the base of the rail with the straight end or shank under the rail and driving until the lip on the straight end snaps in place over the base of the rail on the other side. When in position the anchor is sprung to such an extent that it is prevented from slipping off the rail or sliding lengthwise under the action of creeping. Under test the anchors are said to have been subjected to 25,000 lb. pressure without slipping off the

rails through the anchor and without distortion or set in the metal, while it is reported that examinations of the anchors installed in service thus far have disclosed no loose anchors or cases where slipping has occurred. Instead, the anchors are reported to have repeatedly demonstrated sufficient capacity in service to carry the ties through the ballast. Emphasis is being placed on

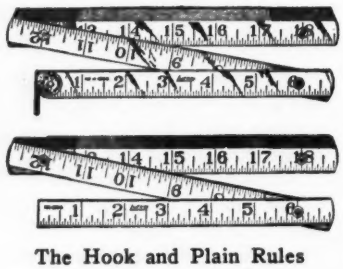


The Weston Anchor in Place

the fact that this anchor cannot be over-driven and that at the same time it can be removed and re-applied repeatedly without losing its efficiency, removal being accomplished by striking the lip end downward with the spike maul. The round section offers no sharp edges to cut the fibre of the tie or nick the rail base. Where the anchor does not bear against the tie when applied to the rail, the adjustment is made by driving it snug with a sledge. The Weston anchor is the product of the Positive Rail Anchor Company, Marion, Ind.

A Folding Rule of Aluminum

RECOGNIZING the value of aluminum where a metal is desired that is both light in weight and unaffected by exposure to deteriorating or disfiguring influences, the Lufkin Rule Company, Saginaw, Mich., has begun the manufacture of rules of this material. These rules are 9/16 in. wide and have 6 in. folds. Like the familiar folding rules of wood they are made in 3-ft., 4-ft., 5-ft. and 6-ft. lengths. At the joints, where the most severe strain on a rule is encountered, solid brass joints are provided and at the same time these joints are given a spring effect which makes them firm enough to hold the rule properly up to its work when extended. The rule



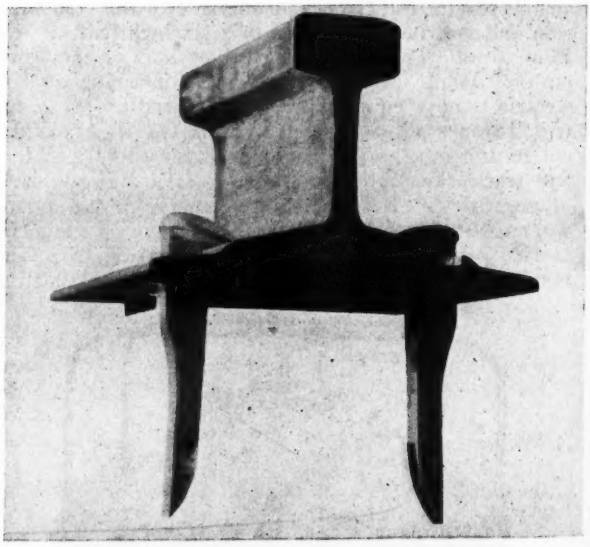
The Hook and Plain Rules

surface is in the natural color with sunken black markings which show up distinctly and are proof against becoming illegible by rusting or wear.

To meet the demand that initially led to the development of a wood rule having a folding end hook, such an attachment has also been provided in the aluminum rules. The device consists of a small brass hook fitted at one end of the rule and so attached that it easily folds up and remains flush with the edge of the rule when not in use. The zero point falls at the inside of the hook when open and at the extreme end of the hook, as in other rules, when closed.

A Unique Form of Track Spike

AN INTERESTING departure from the conventional design of track spikes is seen in the lock spike manufactured by the Railway Lock Spike Company, Atlanta, Ga. The spike is designed for use with a two-shoulder tie plate and has for its function a firm attachment of the tie plate to the rail. This is accomplished by a notch on the inner face of the shank which engages the rib on the under side of the tie plate so that the lower face of this notch and the head of the spike form a jaw which holds the rail and plate together in positive lock. A long curve at the lower end of the spike, together with an extension of the back of the shank opposite the notch on the inner face produces an effect during the driving of the spike such that when the notch clears the rib on the under side



An Assembly View of the Rail, Tie Plates and Spikes

of the tie plate the spike is drawn over against the rail and tie plate, thus effectively locking the rail and plate together.

A number of advantages are claimed for this device, foremost among which is that the spike is secured against withdrawal from the ties. In support of this it is stated that comparative tests made by the Georgia School of Technology at Atlanta, Ga., showed that a pull of 15,920 lb. was required to remove two spikes of this kind from a tie, whereas only 8,000 lb. was required to withdraw two ordinary spikes.

Obviously any withdrawal of the spike from the tie must be effected by lifting the tie plate with the rail with the further result that when the rail is restored to its normal position after the train has passed the spike is again forced into the tie to its full penetration.

The fact that the rail and the plate cannot move relative to the spike eliminates most of the friction against the throat of the spike, thus reducing the throat cutting. According to the manufacturer the use of these spikes in the track of various railroads for the past five or six years has been fruitful of favorable reports from railway officers who not only support the claim of the holding power of the spike but state also that no difficulty is encountered in removing these spikes with the use of the ordinary claw bar.

Special Guard to Save Labor in Maintaining Crossing Paving

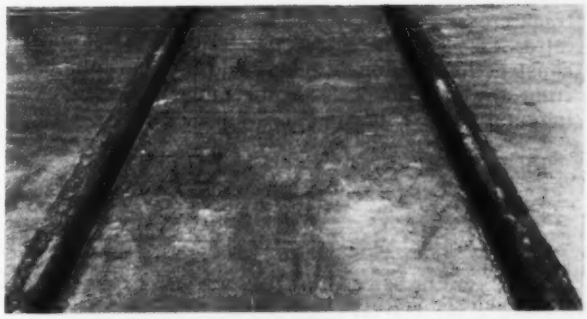
FOLLOWING almost immediately after the introduction of concrete, asphalt and other paving materials for highway crossings there arose the vexatious trouble from fracturing of the pavement at the edges. This trouble developed to such an extent in many of the crossings subject to the more severe exposure and wear as to raise some question as to the economy of using these paving materials extensively at such

Left to Right From Top to Bottom—The Straight Guard, Flangeway Guard, Curb Guard, Special Flangeway Guard.

points, not only because of the attention required by these crossings to avoid the accumulation of material in the flangeways but also due to the difficulty of patching the fractured edges.

This condition has led to the development of various types of guards for holding the pavement intact at such points, prominent among which is a type of construction known as the Godwin steel paving guard. While special forms of these guards are built for the various types of roads, streets, curves and platforms, they are essentially a pressed steel member which is laid at the time of placing the subbase for the finished paving surface so that lugs provided at intervals throughout the section can be imbedded firmly in the foundation of the crossing. For installation along the edge of the paving, as in the flangeway of a track, the member is an angle iron which covers the entire face of the paving material and at the same time extends underneath the finished surface, thus serving essentially as a rigid retaining wall of steel, the stability of which is unaffected by the condition of the finished surface, by reason of its anchorage into the foundation.

The experience thus far with the many installations made have demonstrated the guard to be capable of withstanding the punishment of heavy motor traffic



A Typical Installation of the Godwin Paving Guard.

and as serving effectively in not only preventing the fracturing at the edges but in preventing much of the familiar movement in the finished surface under the traffic. About 200 miles of the guards are in use at the present time, including those laid in connection with street railway paving. The guards are the products of the W. S. Godwin Company, Inc., Baltimore, Md.

Cast Iron Introduced To Reduce Crossing Upkeep

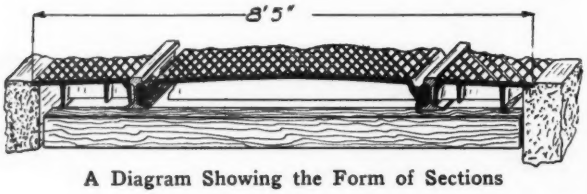
THE USE of cast iron as a means of reducing the labor expended for maintenance and the ultimate cost of highway crossings over railroad tracks at grade is illustrated in crossings built entirely of this material on the main lines of the Chicago, Burlington & Quincy at Armour Junction, Mo., the Atchison, Topeka & Santa Fe at Topeka, Kan., and the Southern Pacific at Dallas, Tex.

These crossings consist of a collection of cast iron plates shaped in such a way as both to fit the track without any adjustment and to form, when in position, a rigid non-slipping surface equal in area to the typical grade crossing. The sections which are laid between the rails are 24 in. wide and are shaped at the ends to rest on an insulating strip of wood placed between the rail base and the cast iron flange and also to accommodate a strip of wood in the flangeway, the latter strips being held securely against dislodgment by the special shape of the casting.

These plates can be installed or removed by an ordinary section gang and are adaptable not only to right angle crossings but to diagonal and multiple

An Installation of the Cast Iron Crossing on a Highway Over Two Tracks

track crossings, special sections being provided in the latter case for the space between the tracks. The construction of the sections is said to secure the plates from any likelihood of rattling under traffic or cracking under the vibration of trains. They are so de-



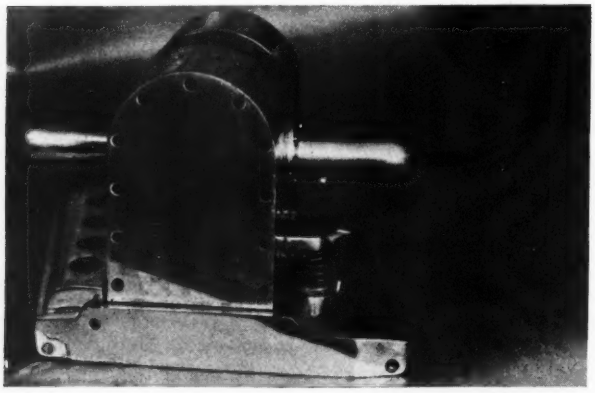
A Diagram Showing the Form of Sections

signed that one or more plates can be removed readily when it is desired to make repairs to ties or rails under the crossing. The crossing is known as the Universal Permanent Highway crossing and is a product of the Locomotive Finished Materials Company, Atchison, Kansas.

A Sand Papering Machine

SANDPAPERING has always been considered indispensable to good results in the enameling or varnishing of floors or other finished woodwork, and yet sandpapering is usually conceded to be one of the most tedious and time-consuming occupations of painters. A machine has now been developed which is claimed to not only make the sandpapering work less tedious but also to save from 70 to 90 per cent of the cost of sanding where the work is of any size.

This tool is a portable electric device of aluminum having a base equipped with a roller near each end to facilitate the movement of the machine back and forth over the surface to be sandpapered. This base supports a housing, in the top part of which is the motor, while the bottom accommodates a drum which carries the sandpaper. Sandpapering with this ma-



An Exterior View of the Barker Portable Sander

chine is accomplished by the revolving action of the drum as the machine is shifted back and forth across the surface to be sandpapered.

Where it is desired to perform flat grinding work instead of sanding, metal abrasive paper is attached to the drum instead of sand paper, either of which can be attached to the drum and the machine made ready for use in less than a minute. The power is furnished by a one-third horsepower motor operating on a 110 volt circuit which permits attaching the machine to the ordinary lighting circuit. The weight of the device complete is about 23 lb. The machine is a product of R. L. Barker & Co., Chicago.

With the Associations

American Railway Engineering Association

The following is the program for the twenty-sixth annual convention, which will be held at the Congress Hotel, Chicago, on March 10-12. Morning sessions will extend from 9 o'clock to 12:30 and afternoon sessions from 2 to 5.

Tuesday, March 10th

President's Address.
Reports of Secretary and Treasurer.
Reports of Standing Committees on:
- Wood preservation.
- Shops and Locomotive Terminals.
- Rules and Organization.
- Iron and Steel Structures.
- Roadway.
- Signals and Interlocking.
- Water Service.

Wednesday, March 11th

Reports of Standing Committees on:
- Electricity.
- Ballast.
- Buildings.
- Economics of Railway Location.
- Masonry.

Memorial Meeting—Albert W. Johnston, H. T. Douglas, Jr.
Reports of Standing Committees on:
- Economics of Railway Operation.
- Yards and Terminals.
- Stresses in Railroad Track.

Annual Dinner, 6:30 p. m.

Thursday, March 12th

Reports of Standing and Special Committees on:
- Uniform General Contract Forms.
- Wooden Bridges and Trestles.
- Track.
- Signs, Fences and Crossings.
- Rail.
- Records and Accounts.
- Economics of Railway Labor.
- Ties.
- Co-operative Relations with Universities.
- Standardization—Progress Report.

New Business.
Election and Installation of Officers.
Adjournment.

Roadmasters' Association

The executive committee of the Roadmasters' and Maintenance of Way Association has taken advantage of the fact that many of the members of the executive committee will be in Chicago during the convention of the American Railway Engineering Association to call a meeting of that committee at the Auditorium Hotel at 9:30 a. m. on Wednesday, March 11. The chairmen of committees are also invited to attend this meeting and to present the reports which they have in course of preparation.

Bridge and Building Association

The members of the executive committee and other members of the association who are in attendance at the convention of the American Railway Engineering Association will meet for luncheon in the dining room of the Davis Company on Wednesday noon, March 11, at 12:30, for the consideration of such business as is of interest to the members of the organization.

The Tie Producers Association

Harry Harmount of the Harmount Tie & Lumber Company, Chillicothe, Ohio, has been elected treasurer of the National Association of Railroad Tie Producers in place of E. E. Boehne, manager of sales of the International Creosoting & Construction Company, Galveston, Tex., who was elected to this position at the annual convention of this association in Chicago on February 6, as reported in the February issue, page 67, but who has been unable to serve.

Maintenance of Way Club of Chicago

At a meeting of the club held on February 10 the subject "Safety in Track Maintenance" was discussed by Frank Wenter, Jr., general claim agent of the Chicago and North Western. Sixty members and guests attended. The next meeting will be held on March 17, one week later than the regular date, this change being made to avoid a conflict with the convention of the American Railway Engineering Association. M. D. Carothers, assistant engineer, Baltimore & Ohio Chicago Terminal, will give a talk on the uses of motor cars for the distribution of track materials as a substitute for work train service.

Directory of Associations

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, secretary, 319 North Waller avenue, Chicago. Next convention, Buffalo, N. Y., October 20-22, 1925.

AMERICAN RAILWAY ENGINEERING ASSOCIATION (Works in co-operation with the American Railway Association, Division IV).—E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Annual convention, Congress Hotel, Chicago, March 10-12, 1925.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—P. R. Hicks, secretary, Room 1146 Otis Bldg., Chicago. Next convention January, 1926, Hot Springs, Ark.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—B. J. Wilson, Pocket List of Railroad Officials, 605 Fisher Building, Chicago. Annual exhibit at convention of American Railway Bridge and Building Association.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS.—J. S. Penney, secretary, T. J. Moss Tie Company, St. Louis, Mo. Next convention January, 1926, Hot Springs, Ark.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly secretary, Seeberger Building, 825 South Wabash avenue, Chicago. Annual exhibition at convention of American Railway Engineering Association. Exhibit March 9-12, 1925, inclusive.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—T. F. Donahoe, secretary, B. & O., Pittsburgh, Pa. Next convention September 22-24, 1925, Kansas City, Mo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Annual exhibit at convention of Roadmasters' and Maintenance of Way Association.

PROGRESS IN VALUATION—A review of the present status of valuation of the railroads up to December 31, 1924, shows that 26 final valuations have been handed down by the Commission and that in addition, tentative valuations of 151 other railroads have become final by reason of their failure to protest. The total final value of the property of the 177 carriers is less than five per cent of the total value so far tentatively determined by the commission.

The Material Market

THE MARKETS for construction materials are now in that indefinite position which exists when neither the buyer nor the seller has the upper hand. Just at present the buyer appears to be playing a waiting game. Owing to the fact that manufacturers have been endeavoring to establish higher prices many prospective purchasers have withheld orders pending the arrival of the actual construction season with the hope that lower prices may be had. On the other hand, many users have specified in large quantities against old contracts and it is said that in some instances they have had little difficulty in making considerable additions to tonnages originally ordered at the old prices. For this reason the prices given below for iron and steel products and which apply to new orders, are not entirely representative of the figures at which a considerable tonnage is now moving. From the table it will be seen that prices remained practically stationary except for moderate changes as regards track material and wire products.

	February		March	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	$2.90 to $3.20	$2.90	$2.90 to $3.20	$3.00
Track bolts	3.80 to 4.25	3.90	3.90 to 4.25	4.00
Angle bars	2.75	2.75	2.75	2.75
Tie plates, steel	2.35 to 2.50	2.35	2.35 to 2.50	2.45
Boat spikes	3.25	3.25	3.25	3.25
Plain wire	2.60	2.65 to 2.70	2.60 to 2.70	2.70 to 2.80
Wire nails	2.85	2.90 to 2.95	2.85 to 2.95	2.95 to 3.05
Barb wire, galv.	3.55	3.60 to 3.65	3.55 to 3.65	3.65 to 3.75
C. I. Pipe, 6 in. to 12 in., ton		49.20		50.20
Plates	2.00 to 2.20	2.30	2.00 to 2.20	2.30
Shapes	2.10	2.30	2.10 to 2.20	2.30
Bars, soft steel	2.10 to 2.20	2.20	2.10 to 2.20	2.20
Rivets, struct.	to 2.60	2.75	2.60	2.75
Cone, bars, billet	2.10 2.20		2.10 to 2.20	
Conc. bars, rail		2.10		2.10
Open hearth rail, per gross ton, f. o. b. mills				43.00

As seen in the table below a further decline has occurred in the scrap market, although the changes are moderate:

PRICES PER GROSS TON AT CHICAGO

	February	March
Relaying rails	$27.00 to $32.00	$26.00 to $31.00
Rails for rerolling	21.00 to 21.50	19.50 to 20.00
Rails less than 3 ft. long	21.00 to 21.50	20.50 to 21.00
Frogs and switches cut apart	18.75 to 19.25	18.50 to 19.00
Steel angle bars	19.50 to 20.00	19.00 to 19.50

The waiting policy on the part of the purchasers is apparent also in the lumber market. In consequence the prices remain practically stationary. A review of statistics in the Southern pine field shows that the unfilled orders on hand at the middle of February were substantially the same as at the corresponding time last year, but fully 30 per cent lower than at the beginning of 1923.

SOUTHERN PINE MILL PRICES

	February	March
Flooring, 1x4, B and B flat	$49.00	$49.75
Boards, 1x8, No. 1	36.80	36.74
Dimensions, 2x4, 16, No. 1, common	31.00	30.13
Dimension, 2x10, 16, No. 1, common	32.15	32.65
Timbers, 4x4 to 8x8, No. 1	30.20	31.29
Timbers, 3x12 to 12x12, rough	40.50	42.17

DOUGLAS FIR MILL PRICES

Flooring, 1x4, No. 2, clear flat	38.00	38.00
Boards, 1x8, 6 to 20, No. 1, common	18.50	18.50
Dimension, 2x4, 16 No. 1, common	20.50	20.50
Dimension, 2x10, 16, No. 1, common	20.00	20.00
Timbers, 6x6 to 8x8, No. 1, common	25.00	25.00
Timbers, 10x10 to 12x12, rough	18.00	18.00

Current prices for Portland cement in carload lots not including packages are given below:

New York	$2.15	Minneapolis	$2.42
Pittsburgh	2.19	Dallas	2.05
New Orleans	2.40	Denver	2.84
Chicago	2.20	San Francisco	2.61
Cincinnati	2.47	Montreal	1.80

News of the Month

The Atchison, Topeka & Santa Fe has acquired a tract of 9,000 acres of land 27 miles north of San Diego, Cal., which it has irrigated and improved through the expenditure of $2,250,000, to be sold in small tracts chiefly for home sites.

The secretary of the National Automobile Chamber of Commerce estimates that 2,500,000 passengers were carried by omnibuses in the United States and Canada in 1924, when about 53,000 buses were in use. Of these, 31,100 are classified as common carrier independent omnibuses and 3,000 are operated by electric railways.

The Interstate Commerce Commission, in a decision made public on February 9, held that the surcharge accruing to the railroads in addition to the regular passenger fare for the transportation of passengers in sleeping and parlor cars is not unreasonable and that the difference in the value of the service abundantly justifies the addition of one tenth in the fare.

The graduate school of Yale University is now offering anually five Strathcona memorial fellowships of $1,000 each to graduates of institutions of high standing who wish to make further studies in transportation. Preference is given to persons or sons of persons who have been connected in some manner for at least two years with the railways of the northwest.

Floods declared to be the worst in the locality since 1841 or 84 years, were experienced in Georgia during February, which seriously impaired all transportation in southeastern United States, some lines being closed for as long a period as two weeks while detours upwards of 600 miles were required required in some cases. The Atlantic Coast Line, the Seaboard Air Line and the Southern were the principal railroads affected, all suffering extensive damage to tracks and bridges as well as in delays and blockades in operation.

The Pennsylvania has undertaken to derive a benefit from the popular interest in cross-word puzzles by offering each month two prizes of $10 for the best puzzle presented by an employee or a member of an employee's family, and also a small prize for the first employee who solves a puzzle after it is published. These puzzles, which must contain words that advertise the railroad, are circularized and passengers are encouraged to study them through the practice adopted of equipping all trains carrying observation cars with dictionaries.

Nine of the 47 railroads required to install automatic train control by the Interstate Commerce Commission's first order, issued in 1922, have completed the roadway installations required by January 1, 1925, according to a statement of the Interstate Commerce Commission. These roads are: The Chicago, Rock Island & Pacific; the Chicago & Eastern Illinois; the Chesapeake & Ohio; the Atchison, Topeka & Santa Fe; the Galveston, Harrisburg & San Antonio; the Norfolk & Western; the Oregon-Washington Railroad & Navigation Company; the Reading, and the Southern Pacific.

Special studies have been launched by the Pennsylvania to determine the most efficient and economical length of track on the various divisions which can be maintained by section gangs equipped with motor cars, and the success of these cars has led the company to adopt a plan looking to the complete motorization of all forces engaged in the maintenance and repair of tracks. There are about 1,000 motor cars now in service on the Pennsylvania, which have replaced about 1,500 hand cars. Partly through the service obtained from these motor cars, the company has already reduced the number of sections by 215, 117 of the subdivisions eliminated being in the Eastern region, 34 in the Central region, 80 in the Southwestern region and 41 in the Northwestern region. Among other things these motor cars have been found to assist materially in recruiting better men for track work.

The Safety section of the American Railway Association will hold its fifth annual meeting at the Morrison hotel, Chicago, on Tuesday, Wednesday and Thursday, April 28, 29 and 30.

A statement has been issued by the American Railway Association showing that 131 fewer persons lost their lives from grade crossing accidents during the safety crossing campaign conducted by the railroads from June 1, 1924, to October 1, than during the corresponding period of 1923, notwithstanding that there was an increase of approximately 20 per cent in the number of automobiles in use. The total number of fatalities arising from grade crossing accidents during the four months' period was 738, as compared with 869 during the same period of 1923. The number of persons injured during this period of 1924 was 2,191, as compared with 2,173 in 1923.

The New York Central has announced that 41,570 employees has accepted the offer of stock in the corporation at $110 a share, which is about $12 a share below the market price. The stock subscribed for is worth more than $12,000,000. Approximately one employee out of every four on the system is on the list of subscribers and the number of common stockholders is more than doubled.

The Chicago, Rock Island & Pacific has inaugurated classes in citizenship for 150 aliens employed in its Chicago yards. Owing to the shortage of space for classrooms, two coaches, completely equipped with blackboards and desks, were installed in the yards, while the teachers were secured from the Chicago Board of Education. The classes meet in the afternoons. Those who complete the course will be given diplomas by the Bureau of Naturalization and those who have already taken out their first citizen papers will be given an examination to decide whether they can qualify as citizens.

As an additional precaution at grade crossings, the Chicago, Burlington & Quincy has provided for the installation of additional whistling posts at crossings where the view of drivers of vehicles or enginemen is unavoidably restricted and where travel has increased. These whistling posts are to be erected 600 ft. from the crossing and so located that the crossing whistle signal will continue until the locomotive is almost, if not quite, at the crossing. All passenger and freight locomotives are also being equipped with a whistle lever located on the fireman's side of the engine to be used by the fireman or brakeman if a vehicle or pedestrian should approach the crossing from that side.

On December 31, 1921, there were 252,507 grade crossings in the United States. During the following year 705 of these crossings were eliminated at a total cost of $7,000,000. In the same year 4,437 new grade crossings were created by the opening of highways across railways with the result that at the end of 1922 there were 3,732 more grade crossings than at the end of 1921, or a total of 256,362. With the cost of eliminating grade crossings in 1921 averaging almost $100,000 per crossing, it has been estimated that the cost of eliminating all the grade crossings that existed at the end of 1923 would have amounted to $19,500,000,000, an expenditure which would require the investment by the railroads of $1,000,000,000 annually for 19 years or as much as the railroads are now expending annually for capital expenditures to enable

them to handle the increased business and reduce operating costs. If, in addition to this, new crossings continue to be opened as fast as they were in 1922, there would still be at the end of the 19 years 84,340 grade crossings.

Class I Railroads, representing a total mileage 236,190 miles, had a net operating income in 1924 of $987,133,650, or a return of 4.35 per cent on their property investment, according to the Interstate Commerce Commission. In 1923 their rate of return was 4.49 per cent. The operating revenues decreased 5.9 per cent, as compared with 1923.

A report of expenses incurred over a period of years in rendering railway service, has been submitted to the Interstate Commerce Commission by the director of statistics which shows that between the test period (the three years ended on June 30, 1917), and 1921, the operating cost of moving one ton of freight one mile increased from 5.1 mills to almost 11 mills, or 113.6 per cent, while the total cost per ton per mile, including taxes and capital charges, was 7.46 mills during the test period and 13 mills in 1921, or an increase of almost 75 per cent. In 1923 the operating cost of moving each ton one mile had declined to 9 mills, while the total cost of moving a ton one mile, including taxes and capital charges, was 11.4 mills. The operating cost of moving a passenger car one mile in 1923 was 34.4 cents, or 91.5 per cent higher than for the test period, while the total cost of moving a passenger car one mile in 1923 was 65.5 per cent higher than the cost for the test period, as compared with these figures the average rate per ton mile charged for freight in 1923 is shown to be about 56.5 per cent higher than for the test period, with the average passenger rate about 49 per cent higher. The increase in the the unit cost of labor for rendering railway service was 119 per cent higher in 1923 than during the test period and the increase in prices of materials and supplies, 74.5 per cent higher.

Decisions of the Labor Board

Following are abstracts of some recent decisions of the United States Labor Board which concern employees of the maintenance of way departments:

Railroad Not Required to Furnish House

The Brotherhood of Maintenance of Way Employees and Railway Shop Laborers presented a case before the labor board concerning a section foreman on the Colorado & Southern at Loveland, Colo. When the foreman was assigned to that station in 1916 he was permitted to occupy a company-owned house and continued to live therein until April 29, 1924, when the railroad served notice on him that he must look for another habitation, owing to the fact that the road desired to tear the house down on account of its unsanitary condition and because its location was such that it interfered seriously with the view of the trainmen approaching the station and with the view of the railroad tracks from a highway. The railroad contended that no article in the agreement with the employees made it obligatory to furnish living quarters to any of the men. The board denied the claim of the employees.—Decision No. 2858.

Basis of Selection of Crossing Flagmen

The United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers filed a request with the Railroad Labor Board for the reinstatement by the Chicago & North Western of a crossing flagman at Glidden, Iowa, and for his compensation for time lost on account of his having been removed from service on October 16, 1923. Prior to this date two flagmen were maintained in this town, but when forces were reduced one man was removed from service.

The evidence submitted indicated that the man who was retained first entered the service of the railway in 1901 and continued therein for approximately 13 years, after which he left the service. He was again employed in 1916 and continued in service until August 5, 1920, on which date he was permitted to lay off on account of his physical condition. The carrier stated that he was advised that he would be permitted to return to the service when physically able. He returned to the service on April 1, 1921, since which time he has continued in the employ of the road.

The employees contended that this man voluntarily left the service on August 5, 1920, and, therefore, lost his seniority rights and that the man who was laid off on October 16, 1923, should have been retained. The road contended that the question of seniority is not the controlling factor in this case, in accordance with a rule in the current agreement reading as follows:

"The general rule of promotion and seniority will not apply to positions of track, bridge and highway crossing watchmen and flagmen at railway (non-interlocked) crossings, but, when practicable, such positions will be filled by incapacitated employees from any department and preference in filling and retaining these positions will be determined by the degree to which incapacitated for other work, seniority in the service of the railway and ability to perform the work."

In its decision the board stated that, all relevant questions being equal, seniority should prevail. In this case, however, the man who was retained in service had a family and had no other means of support, as he was physically unable to perform arduous labor. The man who was replaced, however, is physically able to perform heavy manual labor and was first employed by the road in 1919. He was further shown to be a man of considerable means who was not solely dependent upon this position for a livelihood. The Labor Board, therefore, denied the request of the employees. (Decision No. 2620, September 11, 1924.)

Another Contracting Case

A case involving the contracting of maintenance of way work under somewhat different circumstances than those imposed in most previous cases brought before the board, concerned some bridge and building employees on the Black Hills division of the Chicago & North Western. The employees in question were laid off from about December 1, 1921, until the early part of May, 1922, a period during which a firm of contractors was engaged in the renewal and repair of bridges on this division. The case differs from previous cases in that the contractor started his work some time before the railway employees were laid off, whose work terminated at the normal time of closing down the bridge and building maintenance forces.

The reason given by the railroad for awarding the contract is that the division includes a large mileage of bridges which were badly in need of renewals and repairs and that it had been found impossible to recruit enough men for the regular maintenance forces to carry out the work. No contention was made by the employees' representatives that the contract had been entered into for the purpose of defeating the meaning and intent of the Transportation Act. The decision of the board was that the employees were not entitled to back pay for the time lost.—Decision No. 2860.

Rates of Pay on Emergency Work

A case was brought before the labor board involving section men of the Chicago & North Western who were called at 6:45 p. m. and required to work until 3 a. m. the following day, part of this time being consumed in going to and from the scene of a wreck which they assisted in cleaning up. The railroad paid these men at the rate of time and one-half for time occupied in loading tools and in actual work and half time for the time consumed in going to and from the wreck. The Brotherhood of Maintenance of Way Employees and Railway Shop Laborers contended that the men should have been paid at the rate of time and one-half from the time they were called until they were released, in accordance with Rule 28, while the railroad contended that Rule 43 applied in providing for the payment of one-half time while traveling during overtime hours. In its decision the board held that Rule 43 can be assumed to apply only as a corrollary to the rule which provides for and to the class of employees regularly assigned to outfit cars and that any other construction placed on this rule would in effect annul all rules governing overtime for men in service entirely distinct from that performed by employees using outfit cars. The board's decision sustained the position of the employees.—Decision 2876.

Personal Mention

General

R. C. White, engineer maintenance of way and structures of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to assistant general manager, with the same headquarters, pursuant to the death of **J. M. Egan,** as reported in the February issue. A sketch of Mr. White, with his photograph, appeared in July, 1924, issue.

A. K. H. Drury has been appointed assistant chief engineer of the Board of Railway Commissioners of Canada, with headquarters at Ottawa, Ont., to succeed **T. L. Simmons,** who has been promoted to chief engineer.

Engineering

Charles Haydock, engineer of the Pennsylvania Railroad Water Companies, has resigned to become vice-president and general manager of the Lansdale Foundry Company, Inc., Lansdale, Pa.

D. Hubbard, division engineer on the Chicago division of the Chesapeake & Ohio, with headquarters at Peru, Ind., has been transferred to the Cincinnati and Northern division, with headquarters at Covington, Ky., to succeed **B. V. Davis,** who has been transferred to the Chicago division.

W. E. Heimerdinger, formerly locating engineer on the Chicago, Rock Island & Pacific, has been promoted to office engineer in the general manager's office at Des Moines, Iowa, following the appointment of **T. P. Warren** as division engineer at Chicago, as noted elsewhere in this issue.

J. L. Downs, formerly roadmaster of the Illinois division of the Illinois Central, with headquarters at Champaign, Illinois, whose recent promotion to district engineer of the Northern lines, with headquarters at Chicago, to succeed **M. M. Backus,** was reported in the February issue with the announcement of other changes in officers following the election of **F. L. Thompson,** chief engineer, to vice-president in charge of Chicago Terminal Improvements, was born in Greencastle, Ind., and received his early education in the high school in that locality. He entered railway service in 1896 as a trackman on the Illinois Central and has served continuously with this company since in the successive capacities of section foreman at various points, supervisor of road, and supervisor of track and trains up to the time of his promotion to roadmaster, in which capacity he was employed at various points until his ultimate transfer to Champaign, Illinois, where he was serving, as mentioned above, at the time of his recent promotion to district engineer, effective February 1.

J. L. Downs

R. E. Mohr has been appointed architect in the office of the chief engineer of the Wabash, with headquarters at S. Louis, Mo., succeeding **C. Hummel,** deceased. **T. L. Roach** has been promoted to assistant engineer on the Peru division of the Wabash, with headquarters at Peru, Ind., succeeding **H. S. Howard,** who has been transferred to the Detroit division, with headquarters at Montpelier, Ohio, in place of **J. S. Gamble,** who has been promoted to track supervisor, as noted elsewhere in these columns. **V. R. Hayes,** track supervisor at Forrest, Ill., has been appointed assistant engineer on the Springfield division, with headquarters at Springfield, Ill., succeeding **J. C. Bousfield,** who has been appointed assistant engineer in the office of the chief engineer, with headquarters at St. Louis, Mo., in place of **S. W. Crowe,** who has been promoted to the newly created position of division engineer of the Chicago Terminal division, with headquarters at Chicago.

A. A. Miller, superintendent of the Memphis division of the Missouri Pacific, with headquarters at Wynne, Ark., has been promoted to engineer maintenance of way and structures, with headquarters at St. Louis, Mo. Mr. Miller was born on September 28, 1879, at Zanesville, Ohio, and received his education at the Ohio State University from which he graduated in 1902. He entered railway service in June, 1902, as a rodman on the Baltimore & Ohio at Wheeling, W. Va., since which time he was employed up to January, 1907, as transitman and assistant engineer, consecutively, when he became division engineer at Philadelphia, Pa. From September, 1907, to June, 1909, he was engaged as chief engineer for the West Coast Company at Los Angeles, Cal., and in June, 1909, entered the service of the Missouri Pacific as assistant engineer, which position he held until June, 1911, when he was promoted to division engineer. From January, 1918, to April, 1921, he served as district engineer, and in May, 1921, was made division superintendent, which position he was holding at his recent promotion to engineer maintenance of way and structures.

A. A. Miller

E. C. Menuez and **J. C. Powell,** assistant valuation engineers on the New York Central, with headquarters, respectively, at New York City and Cleveland, Ohio, have been promoted to valuation engineers of the lines east, with headquarters at New York City, and of the lines west, with headquarters at Cleveland, Ohio, respectively, following the promotion of **J. H. Roach** to chief valuation engineer, as reported in the February issue.

C. W. Beck, assistant on the engineer corps of the Eastern division of the Pennsylvania, Central region, has been promoted to assistant to the division engineer, with headquarters at Pittsburgh, Pa., and **E. W. Wiseman,** assistant to the engineer maintenance of way of the Northern division, with headquarters at Buffalo, N. Y., has been appointed assistant to the division engineer of the Renovo division, with headquarters at Erie, Pa.

T. P. Warren, whose promotion to division engineer of the Chicago terminal division of the Chicago, Rock Island & Pacific, was reported in the February issue, was born on March 24, 1887, at Covington, Ky., and received his engineering education at the University of Kentucky, from which he was graduated in 1910. He entered the railway service in August, 1910, as a draftsman on the Chicago, Rock Island & Pacific at Cedar Rapids, Iowa, and from April, 1912, to April, 1917, served consecutively as a rodman, instrumentman and assistant engineer at Des Moines, Iowa, when he was transferred to the Nebraska division at Fairbury, Neb., as assistant engineer. He was appointed office engineer in the general manager's office at Des Moines, Iowa, in March, 1920, and in November, 1923, became resident engineer on the Des Moines river bridge at Eldon, Iowa, which position he was holding at the time of his recent appointment as division engineer at Chicago.

Track

R. N. Crapster, assistant engineer on the Louisville & Nashville, with headquarters at Nashville, Tenn., has been promoted to roadmaster, with headquarters at Paris, Tenn., to succeed **J. E. Lockhart,** who has been transferred to Etowah, Tenn., in place of **L. L. Adams** upon the latter's trans-

fer to the Louisville, Ky., terminal. **S. Williamson,** supervisor of construction, has been promoted to roadmaster, with headquarters at Birmingham, Ala., to succeed **J. W. Harris,** whose death was announced in the February issue.

William H. Jones, acting roadmaster of the Third district of the Atchison, Topeka & Santa Fe, with headquarters at Chillicothe, Ill., has been promoted to roadmaster, with the same headquarters.

W. O. Dennis, supervisor of track on the Lehigh & New England with headquarters at Pen Argyl, Pa., has been promoted to inspector of maintenance of way with headquarters at Bethlehem, Pa. **John Crout** has been appointed supervisor with headquarters at Bath, Pa., succeeding **J. H. C. Roberts,** transferred to Pen Argyl to succeed Mr. Dennis.

George E. Lowe, roadmaster on the Delaware, Lackawanna & Western with headquarters at Elmira, N. Y., has been promoted to general roadmaster with headquarters at Scranton, Pa., succeeding **Martin Gill,** who has retired. **Frederick Wilcox** has been appointed supervisor at Elmira succeeding **L. H. Black,** who has been promoted to roadmaster with the same headquarters to succeed Mr. Lowe.

Charles M. Hayes, roadmaster on the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Appleton, Wis., has been promoted to acting assistant general roadmaster, system, to succeed **J. B. Kelly,** who has been promoted to general roadmaster of the Minneapolis, St. Paul & Sault Ste. Marie, the Duluth, South Shore & Atlantic and the Mineral Range, with headquarters at Minneapolis, Minn., to succeed **Jerry O'Connor,** deceased.

J. S. Gamble, assistant engineer on the Detroit division of the Wabash, with headquarters at Montpelier, Ohio, has been promoted to track supervisor, with the same headquarters, to succeed R. D. Copeland, who has been transferred to the Chicago Terminal division, with headquarters at Chicago, in place of **J. A. Buck,** who has been transferred to Forrest, Ill., to relieve **V. R. Hayes,** who has been appointed assistant engineer, as noted elsewhere in these columns.

W J. Connors, whose promotion to supervisor of track on the Cleveland division of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, was reported in the February issue, was born on November 28, 1897, at Bellevue, Ohio, and entered railway service on May 23, 1917, as a helper in the maintenance of way storehouse on the New York, Chicago & St. Louis at Bellevue. From July 1, 1917, to August 1, 1919, he was employed as a supervisor's clerk on the Ft. Wayne division, and from August 1, 1919, to April 1, 1920, in the same capacity on the Buffalo division, when he was promoted to chief clerk to the superintendent of track, maintenance and construction in the general office at Cleveland, Ohio. On December 16, 1924, he became chief clerk to the assistant chief engineer and was serving in this capacity at the time of his promotion to supervisor of track.

Martin Stevens, track foreman on the Chicago, Burlington & Quincy, with headquarters at Omaha, Neb., has been promoted to general yard foreman at Denver, Colo., to succeed **W. G. Kerst,** who has been promoted to roadmaster, with headquarters at Wymore, Neb., in place of **O. L. Corwin,** who has been transferred to Omaha, Neb., to succeed **C. C. Terhune,** deceased. **Phil Rohan,** extra gang and section foreman on the Sheridan division, with headquarters at New Castle, Wyo., has been promoted to roadmaster, with the same headquarters, to succeed **W. W. Weckwerth,** who has been transferred to the Wyoming division, with headquarters at Tecumseh, Neb., in place of **S. B. Rice,** pensioned. **C. W. Wallace,** section foreman on the Sterling division, with headquarters at Sterling, Neb., has been promoted to roadmaster of the McCook division, with headquarters at Orleans, Neb., to succeed **W. W. Flack,** who has been transferred to the Lincoln division, with headquarters at Sutton, Neb., in place of **J. H. Fleming,** retired on pension.

Noah Bridges, whose promotion to roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Arkansas City, Kan., was reported in the December, 1924, issue, was born on April, 18, 1890, at Smithton, Mo., and was graduated from the Oklahoma Southeastern State Normal College and the Oklahoma Presbyterian College. He entered railway service for the first time when eight years old as a lamp tender for interlocking plants on the Wabash and Big Four, which duties he performed before and after school hours for four years, when he became a water boy on the St. Louis-San Francisco. After serving in this capacity during school vacations for three years he secured employment as a timekeeper and subsequently served as a laborer until 1908, when he was appointed assistant foreman. He entered the service of the Atchison, Topeka & Santa Fe in 1910 as a section and extra gang foreman on the Oklahoma division, and served in this capacity until March, 1920, when he was promoted to roadmaster. With the abolishment of this position in June, 1921, he resumed the position of section foreman until April, 1922, when he was appointed acting roadmaster, serving successively in this capacity and as general foreman and assistant roadmaster until his recent promotion to roadmaster.

Bridge and Building

J. B. Carton, assistant superintendent of the Radford division of the Norfolk & Western, with headquarters at Roanoake, Va., has been appointed general bridge inspector, with the same headquarters, succeeding **J. R. Anderson,** deceased.

E. A. Roberts, assistant to the division engineer of the Renovo division of the Pennsylvania, Central region, has been appointed master carpenter of the same division, with headquarters at Erie, Pa., to succeed **H. W. Roberts,** who has been retired on pension.

Purchases and Stores

W. H. Fitzpatrick, traveling storekeeper of the Chicago & North Western, with headquarters at Chicago, has been promoted to assistant general storekeeper, with the same headquarters, succeeding **A. L. Tucker,** who has retired. **D. W. Corcoran,** traveling storekeeper, with headquarters at Chicago, has been promoted to assistant general storekeeper, with the same headquarters. **W. S. Sanford** has been appointed district storekeeper, with headquarters at Green Bay, Wis., succeeding **W. F. Redman,** promoted. **E. J. Leonard,** division storekeeper, with headquarters at Clinton, Iowa, has been transferred to the Iowa division, with headquarters at Boone, Iowa, succeeding **F. H. Fick,** promoted. **F. B. Taylor** has been appointed division storekeeper on the Iowa division, with headquarters at Clinton, Iowa, succeeding Mr. Leonard.

Obituary

Ernest S. Rice, assistant engineer on the staff of the chief engineer, system, of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, died in that city on January 27, after having served continuously with the Santa Fe for 44 years. Mr. Rice was born on July 4, 1868, in Unionville, Mo., and entered the service of the Atchison, Topeka & Santa Fe in 1880 as a messenger boy. He was transferred to the engineering department in 1887, in which he served consecutively as draftsman, topographer, transitman, chief draftsman and assistant engineer up to the time of his death. From 1887 to 1900 his time was divided between new line construction and engineering matters in connection with auxiliary companies, and from 1900 to 1919 he served continuously in the Chicago office, handling new line construction. A considerable portion of his time from 1919 until his death in 1925 was spent in handling engineering problems between the city of Chicago and the railroad.

Ernest S. Rice

Construction News

The Arizona Eastern has received from the Interstate Commerce Commission an amended certificate authorizing the construction of a proposed line from Hassayampa to Dome, Ariz., on a different route from that originally proposed. It is to be built on the south side of the Gila river and along the Southern Pacific as a second track for 16 miles east of Dome to a point near Wellton station, thence at an angle from the Southern Pacific to a place on the Gila river that has been found suitable for a bridge, thence across the river and on to a point in the original location about 30 miles east of Dome, and thence along the route as first determined to Hassayampa.

The Atchison, Topeka & Santa Fe has awarded a contract to the Eberhardt Construction Company, Salina, Kans., for the remodeling and construction of an addition to its passenger station at Emporia, Kans., reported in November.

This company plans to construct a branch line, 65 miles long, from Doud, Tex., west to the Texas-New Mexico state line and a 56-mile extension of the Elkhart, Kans., branch in a southwesterly direction.

The Bangor & Aroostook has authorized the construction of a reinforced concrete enginehouse and oil store at Millinocket, Me., to cost $75,000. This company has awarded a contract for a bridge to the American Bridge Company to cost approximately $60,000. This bridge will consist of two 150-ft. spans and a 33-ft. deck-plate girder, E-60 loading and will be over the East branch of the Penobscot river at Grindstone, Me.

The Cambria & Indiana has received a certificate from the Interstate Commerce Commission authorizing the construction of a 5-mile extension to its line beginning at Revloc, Cambria county, Pa., to cost approximately $516,311.

The Chesapeake & Ohio has received authority for an appropriation of $65,000 for the enlargement of the railroad Y. M. C. A. building at Peach Creek, W. Va., and is constructing six storage warehouses and tracks to serve them at Morrison, Va., to cost approximately $102,600.

The Chicago & Alton plans the construction with company forces of additional yard tracks at North Wood River, Ill., to cost $25,000, also a brick freighthouse at Fulton, Mo., to cost $16,000.

The Chicago & Northwestern has received authority from the Interstate Commerce Commission to construct a branch line of 7.8 miles from a connection with the main line at Beaton, Mich.

The Chicago Great Western has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for the construction of a 100-ton frame coaling station with motor drive continuous "V" bucket elevator at Marshalltown, Iowa, to replace a coaling station recently destroyed by fire.

The Chicago, Rock Island & Pacific contemplates the construction of 42 miles of second main track from McFarland, Kan., to Latimer, to cost $1,200,000; 42 miles of branch line from Billings, Okla., to Ponca City, to cost $854,000; a grain elevator at Council Bluffs, Iowa, to cost $200,000; a freight terminal at Omaha, Neb., to cost $50,000; a passenger station at Tucumcari, N. Mex., to cost $35,000; track elevation in Chicago to cost $300,000; a coal chute at Topeka, Kan., to cost $30,000; an electric shop at Chicago to cost $15,000 and car shops at El Reno, Okla., to cost $15,000.

The Great Northern has authorized the construction of water treating plants at Benson, Minn., Morris and Herman; a power plant at Minot, N. Dak.; an engine terminal at Troy, Mont.; gravel washing plants at Chinook, Mont., and Warland; line revisions at Kipp, Mont., Durham and Coran; and extensions to passing tracks and additional sidings at 33 stations at various points along the line. The cost of these projects will aggregate $1,120,000.

The Houston, Beaumont & Orange Interurban (Electric) has awarded a contract to W. H. Nichols & Co., Houston, Tex., for the construction of a 110-mile electric interurban line from Houston via Beaumont to Orange.

The Illinois Central has awarded a contract to Joseph E. Nelson & Sons, Chicago, for the construction of foundations for the locomotive and car repair shops at Paducah, Ky., reported in the February issue as including a locomotive erecting shop, locomotive repair shop, car repair shop, carpenter ship, wood mill and storeroom, foundry, boiler shop, blacksmith shop, power house, tank shop and air brake shop to cost all together approximately $6,000,000.

This company has awarded a contract to the Railroad Water & Coal Handling Company, Chicago, for the installation of its water supply facilities at Markham yard, Chicago, reported in the February issue, the project to include the construction of a pump house, the laying of 34,000 ft. of five-inch pipe line and the erection of five water tanks, all at a cost of approximately $195,000.

This company plans the construction of a one-story passenger station, 24 ft. by 90 ft., at New Athens, Ill.

The Los Angeles & Salt Lake has awarded a contract for the construction of a brick garage, 66 ft. by 180 ft. at Cedar City, Utah, to cost $40,000.

The Louisville & Nashville contemplates the construction of a large terminal at Leewood (Memphis), Tenn., for which preliminary plans are now being made.

The Michigan Central plans the construction of new facilities at various points on its line which will aggregate $2,200,000 in cost. These projects include the extension of a dock along the Detroit River at Detroit, Mich., at a cost of $510,000; grade separation in Detroit, to cost $500,000; a freight station for fruit and other perishables at Detroit, to cost $170,000; separation of grades at Monroe avenue, Wayne, Mich., at a cost of $150,000; at Detroit avenue, Toledo, Ohio, at a cost of $117,000; at Carma, Mich., at a cost of $55,000; at Belleville Road, Wayne, Mich., at a cost of $64,000; and at Prospect street, Ypsilanti, Mich., at a cost of $45,000; a steel and concrete bridge to replace a trestle at Irving, Mich., to cost $37,000; replacement of the superstructure of a bridge at Union City, Mich., at a cost of $41,000; replacement of girder spans for heavier loading at Kalamazoo, Mich., and Battle Creek, Mich., at cost of $54,000 and $34,000 respectively; replacing an approach span of a draw bridge at Bay City, Mich., at a cost of $40,000; additional yard tracks at Hartsdale, Ind., to cost $107,000; second main track on the belt line extension at Detroit, to cost $33,000; a storage yard on the belt line extension at Detroit to cost $44,000; and storage tracks at Wyandotte, Mich., to cost $53,000.

The Missouri-Kansas-Texas has awarded a contract to the Graver Corporation, East Chicago, Ind., for the erection of a water softener with a capacity of 15,000 gal. per hr., at Wichita Falls, Tex.

This company's plan for constructions and betterments in 1925 includes the construction of concrete piers and pile trestle approach to a bridge on the Houston division at a cost of $50,000 to be done partly by company forces and partly under contract; additional trackage at Springtown, Okla., to be constructed by company forces at a cost of $21,000; additional car sidings and a cinder pit at McKittrick, Mo., to be constructed by company forces at a cost of $30,000; the replacement of 341-ft. trestle with creosoted ballast deck trestle on the Dallas division to be carried out by company forces at a cost of $19,000; and the replacement with a concrete structure of a 314-ft. trestle on the Dallas division at a cost of $24,500 to be carried out under contract.

The Missouri Pacific plans the construction of a freight house at Omaha, Neb., at a cost of approximately $300,000 and has called for bids for the construction of a passenger station at El Dorado, Ark.

The Morris & Essex and the Delaware, Lackawanna & Western have been authorized by the Interstate Commerce Commission to construct a 6.77 mile line from Kingsland staiton to Harrison, N. J.

The Nashville, Chattanooga & St. Louis has awarded a contract to the Gould Contracting Company, Nashville, Tenn., for the construction of a reinforced concrete roundhouse at Hollow Rock Junction, Tenn., at a cost of approximately $70,000 to replace a frame roundhouse recently destroyed by fire. This company plans a line revision at Hollow Rock, Tenn., with company forces to cost $48,000.

The Nevada-California-Oregon is reported to be planning to apply to the Interstate Commerce Commission for permission to construct an extension from Lakeview, Ore., to Odell Junction, over 100 miles or to Bend, Ore., approximately 106 miles. The plans also include the widening of the present narrow-gage line to standard gage.

The New York Central has awarded a contract to the Fort Pitt Bridge Works for the steel work for a bridge to eliminate a grade crossing at Suspension Bridge, N. Y., to cost approximately $86,600 and has awarded a contract to the Walsh Construction Company for the erection of a bridge 1.1 miles north of Jersey Shore, Pa., to cost approximately $54,600.

The New York, Philadelphia & Norfolk and the Pennsylvania have been authorized to construct an extension from a point on Chesapeake Bay near the mouth of Little Creek to a point on the Norfolk & Western in Norfolk, Va., 5 miles. The cost of the project is estimated at $3,299,740. This includes $942,500 for land; $560,674 for track items; $229,000 for station and office buildings and $1,322,477 for wharves and docks.

The New York, Westchester & Boston, a subsidiary of the New York, New Haven & Hartford, has awarded contracts to Dwight P. Robinson & Company for the extension of this line from its present terminus at Larchmont, N. Y., to Mamaroneck, about 2 miles. The new construction will be double track, and will be equipped with overhead structures for 11,000-volt a. c. electric operation. The cost of the extension will be in excess of $800,000.

The Pacific Fruit Express has awarded contracts to Rowland & Neison, Ogden, Utah, and Guthrie & Company, Portland, Ore., for the construction of car repair shops at Nampa, Idaho, to cost $450,000.

The Pennsylvania plans the rearrangement with company forces of its facilities at Twelfth street in Chicago, at a cost of $70,000.

This company has awarded a contract for the construction of a second main track from Highland, Ohio, to Cromers, at a cost of $352,000, a contract to the Ferguson & Edmondson Company, Pittsburgh, Pa., for grading and track work at No. 1 Dock, Sandusky, Ohio, to cost approximately $55,000 and a contract for grading, masonry and track work for addition tracks at Thurlow (Pa.) yard to the James McGraw Company, Philadelphia.

The Pere Marquette is now engaged in grade separation work at Novi, Mich., which will cost $240,000 and plans to undertake the following additional improvements this year, the cost of which will aggregate $3,500,000: Grade separation at Plymouth Road, Detroit, Mich., to cost $125,000; a bridge across the Galien river near Union Pier, Mich., to cost $80,000; an electric power plant to operate the bridge across the St. Joseph river near St. Joseph, Mich., to cost $25,000; a coaling station at Ludington, Mich., to cost $10,000; and another coaling station at Sarnia, Ont., to cost $10,000; a water treating plant at Wyoming, Mich., to cost $15,000; and an interlocking plant at Carleton, Mich., to cost $80,000, of which the Pere Marquette will pay $32,000. In addition to these, the budget includes the sum of $99,000 for stations at various points, $160,000 for passing tracks and sidings of which $50,000 will be spent on the Ludington-Saginaw line, and signals and interlockers to cost a total of $155,000.

The San Antonio & Aransas Pass has awarded a contract to the Truscon Steel Company, Youngstown, Ohio, for the erection of the superstructure of a freight station at Yoakum, Tex., to cost $30,000.

The San Antonio & San Angelo, of which L. J. Gould of San Antonio, Tex., is chief engineer, has awarded a contract to Paul Hanson of San Antonio, Tex., for the construction of the first 40 miles of a new line from San Antonio to Medina Lake.

The St. Louis-San Francisco contemplates the construction of a combined passenger station and general office building at Springfield, Mo.

The Tampa Southern has applied to the Interstate Commerce Commission for authority to construct an extension from Sarasota to Fort Ogden, Fla., 39 miles, to be operated by the Atlantic Coast Line.

The Texas & Pacific is preparing plans for the rebuilding of part of its car shops at Marshall, Tex., which were destroyed by fire on January 16, with a loss estimated at $200,000 and will soon call for bids for the construction of yard and engine terminal facilities at Alexandria, La., to be used jointly with the Missouri Pacific. This project will cost approximately $1,000,000. This company has awarded a contract to the List Construction Company, Kansas City, Mo., for the grading for a new yard and engine terminal facilities at Shreveport, La., the entire project to cost $925,000, and has awarded a contract for concrete subways and other culvert jobs in connection with the work at Shreveport, to C. H. Johnson, Dallas, Tex. Bids will soon be asked for the construction of new yard and engine facilities at Dallas, Tex., to cost a total of $960,000.

The Union Pacific has awarded a contract for the construction of a stucco passenger and freight station at Parco, Wyo., to cost $57,000. This company has also awarded a contract for the construction of a 24-ft. by 84-ft. frame passenger station at North Bend, Nebr., to cost $15,000. Company forces will erect a 350-ton steel coaling station with sanding and water facilities at La Salle, Colo., at a cost of $65,000.

The Wabash has accepted the plan of engineers for the city of St. Louis for the elimination of the grade crossing in that city at Delmar boulevard to be accomplished by constructing a viaduct for street traffic over the railroad tracks. The Wabash had proposed to eliminate the crossing by carrying the tracks over the street. In addition to the Delmar boulevard the plan includes the construction of separated crossings at De Baliviere avenue, Union boulevard, Waterman avenue and Kingsbury boulevard where the streets will be carried over the railroad tracks. At Olive street another grade will be eliminated by constructing the Wabash tracks over the street. It is estimated that six years will be required for the work.

Equipment and Supplies

The Atchison, Topeka & Santa Fe has divided an order for 12,300 tons of rails between the Inland Steel Company and the Illinois Steel Company.

The Boston & Albany has received bids for about 1,100 tons of steel for a new station and subway at Springfield, Mass.

The Chesapeake & Ohio is arranging for the purchase of 30,000 tons of rails.

The Chicago, Rock Island & Pacific has placed orders for 45,000 tons of rails divided as follows: Illinois Steel Company, 37,845 tons; Inland Steel Company, 5,000 tons, and Colorado Fuel & Iron Company, 2,155 tons.

The Florida East Coast has inquired for 300 tons of steel for three bridges.

The Lehigh & New England has ordered about 200 tons of structural steel for bridge work from the McClintock-Marshall Company.

The New York Central has asked for bids on about 600 tons of steel for three bridges in Indiana and Ohio.

The New York, Chicago & St. Louis has inquired for 3,000 tons of tie plates.

The Vicksburg, Shreveport & Pacific has ordered 197 tons of structural steel from the American Bridge Company.

The Wabash has divided an order for 5,000 tons of rails between the Inland Steel Company and the Illinois Steel Company.

"Safe Drivers' Clubs" for railroad employees and other persons who operate automobiles are proposed by the committee on the Prevention of Highway Crossing Accidents, of the Safety Section of the American Railway Association. In view of the reduction in the number of automobile fatalities at crossings during the past summer, following the activities of the railroad safety organizations, and also because of the results from the formation of drivers' clubs, the committee desires to see the early organization of such clubs all over the country.

Supply Trade News

Oscar W. Loew has been placed in charge of advertising and sales promotion of the Truscon Steel Company, Youngstown, Ohio.

The Joseph Dixon Crucible Company, Jersey City, N. J. has removed its Boston, Mass., office from 49 Federal street to 80 Federal street, which is the new Chamber of Commerce building.

T. S. Leake, president and founder of the T. S. Leake Construction Company, general contractors, Chicago, since 1908, has retired and turned the business over to his employees who have been with him since 1911. Under the new organization, **J. H. Wylie,** secretary, will be president and treasurer, **J. D. Leake,** vice-president, will remain in that capacity, and **John Larson,** estimating engineer, will be secretary. **C. O. Congdon,** chief engineer of the T. S. Leake Construction Company and the Railroad Water and Coal Handling Company since 1923, will devote his entire attention to the Railroad Water & Coal Handling Company, which will operate independently of the T. S. Leake Company, with **M. D. Miller** continuing as president of the firm.

T. S. Leake

T. S. Leake was born on August 9, 1860, in Ottawa, Ill., where he learned the carpenter trade and obtained his first employment with the Sanders Bros. Manufacturing Company. In 1880 he entered the employ of the Illinois Central as a carpenter in the building department at Chicago and in 1897 was promoted to superintendent of buildings for the system. He resigned from the Illinois Central in 1906 to enter the employ of the Missouri Pacific and the St. Louis, Iron Mountain & Southern as superintendent of buildings for both lines, with headquarters at St. Louis. He held this position until 1908 when he resigned to incorporate the T. S. Leake Construction Company, Chicago, of which company he has been president until his retirement.

J. H. Wylie

J. H. Wylie was born on January 26, 1875 in Plainfield, Ill. He started his business career in 1892 as private secretary to Judge John D. Caton, which position he held until 1896 when he entered the employ of Swift & Co. as assistant in the secretary's office at Chicago. In March, 1900, he resigned to enter the employ of the Illinois Central as assistant chief clerk to the superintendent of bridges which position he held until 1901 when he was made chief clerk to the master carpenter. In 1905 he was transferred to the chief engineer's office where he was placed in charge of the accounting and later made chief clerk to the engineer of bridges and buildings. In October, 1913, he resigned to enter the employ of the T. S. Leake Construction Company as office manager, which position he held until 1916, when he was promoted to secretary of the T. S. Leake Construction Company, and also secretary of the Railroad Water & Coal Handling Co., which position he has held until his recent election to president.

J. D. Leake was born on November 7, 1890, in Chicago, and was educated at the Northwestern Miiltary Academy and St. Charles Military Academy at St. Charles, Mo. He started his business career in 1910 as timekeeper for the T. S. Leake Construction Company, and in 1921 was promoted to vice-president, to which position he has been re-elected under the reorganization.

John Larson was born on March 29, 1874, in Lund, Sweden, and came to America in 1892. During the following year he was employed by contractors as a carpenter and in 1893 he entered the employ of the Illinois Central as a carpenter in the building department, which position he held until 1901 when he was promoted to building inspector. From 1901 to 1903 he was in charge of building construction on the Des Moines, Iowa Falls & Northern (now a part of the Chicago, Rock Island & Pacific) and in the latter year he returned to the Illinois Central as building inspector, which position he held until 1906, when he resigned to enter the employe of the Missouri Pacific as general building inspector. In 1911 he entered the employ of the T. S. Leake Construction Company as estimating engineer, which position he has held until his recent election to president.

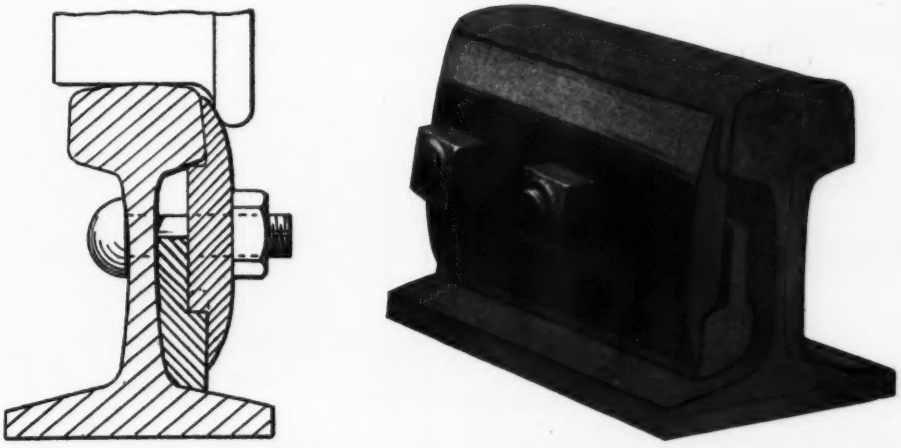
W. G. Zahrt, sales manager of the pump and tank divison of the Wayne Tank & Pump Company, Fort Wayne, Ind., has been appointed director of sales in charge of the sales organizations. **F. O. Sallee,** manager of oil company sales, has been appointed sales manager of the pump and tank division. **R. G. Ewell** will continue in charge of the water softener sales as well as of the oil burner section.

The Canadian Concrete Products Co., Ltd., has established a sales office in Montreal at room 312, Transportation building, with **Paul Kircher,** who has been elected vice-president, in charge. Mr. Kircher was born on July 27, 1890, in Chicago, and was educated at the University of Illinois, where he received the degree of A. B. in 1911, with the degree of B. S. in civil enigneering in 1912 and the degree of C. E. in 1918. From June to September, 1911, he was employed as a chainman for the city and county surveyor in Chicago. From December, 1912, to March, 1913, he was a rodman in the city engineer's office at Chicago. From the latter date until August, 1924, he held the position of chainman, rodman and instrumentman, resigning on the latter date to enter the employ of the Illinois Central as a draftsman. In November, 1916, he resigned from this position to enter the employ of the Universal Portland Cement Company, Chicago, as an engineer in the promotion bureau, which position he held until October, 1917, when he entered the employe of the Massy Concrete Products Corporation as office manager. He held the latter position until February, 1919, when he was promoted to sales manager, which position he held until May, 1919, when he was appointed resident manager of the Massey Concrete Products Corporation and the Canadian Concrete Products Company, Ltd. In August, 1920, he was promoted to manager of the pole department of the Massey Concrete Products Corporation and resident manager of the Canadian Concrete Products Company, Ltd., which position he has held until his recent election. In addition to being vice-president of the Canadion Concrete Products Company, Ltd., he is resident manager of the Union Switch & Signal Company, and engineering advisor to the president of the Massey Concrete Products Corporation.

Paul Kircher

Announcing

The Reversible "Mack" Switch Point Protector



The new reversible feature provides for the use of the top and bottom edges of the protector. By reversing the protector after the top edge shows signs of extreme wear, the bottom edge can be used for protecting the switch point. Therefore twice the wear is obtained.

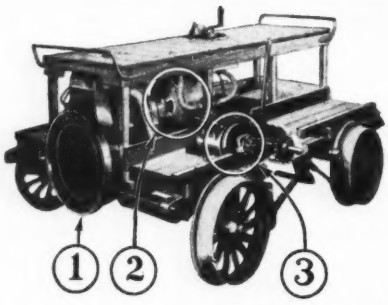
The "Mack" Switch Point Protector saves four to five switch point replacements and acts as a safety device as it prevents the possibility of derailments at switch points.

Made of manganese steel, to fit any size rail. Installed by one man in a few minutes.

Investigate this Labor, Money Saving and Safety Device. It will pay you to write today for a few "Mack" Switch Point Protectors for test. When writing send description of rail.

J. R. Fleming & Sons Co., Inc.

Scranton, Pa., U. S. A.



1. The "New-Way Engine.
2. Electric generator it drives.
3. Electric Motor.

THE JACKSON ELECTRIC TIE TAMPER USES THE SIMPLIFIED AIR-COOLED "NEW WAY" ENGINE AS STANDARD POWER

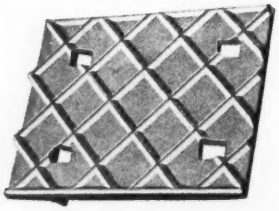
Because the "New Way"

1. Is ideal for operating electric generators.
2. It delivers its dependable power in all temperatures without water and its attendant troubles.
3. For generator charging, road-way tools and machinery, travelling car shops and power cars the "New-Way" is supreme.

The "New-Way" is also standard power on the Euclid gasoline and electric power car shown.

THE "NEW-WAY" MOTOR COMPANY
LANSING, MICHIGAN, U.S.A.

Sellers Anchor Bottom



Wrought Iron Tie Plates

Efficient
- Hold track to gauge
- Seat square to the rail
- Do not injure the tie
- Stop season checks in tie
- Bottom ribbing is a truss equal to one sixteenth inch additional solid section

Durable
- **Rolled end over end**
- **Never break**
- **Made of Wrought Iron—corrosion retarded**

Made in all sizes—with level or tapered rail seat, and with or without crown or cambre

SELLERS MANUFACTURING COMPANY
Illinois Merchants Bank Bldg., Chicago, Ill.

The IDOL TRACK LINER

The Idol Track Liner

NOW IN USE ON 86 RAILROADS

The Idol Track Liner will line track frogs, switches, space ties, raise low joints without disturbing the road bed as no digging is necessary. They will pay for themselves every day by work you will be able to do with a few men. They will save you 50% in labor costs.

The IDOL TRACK LINER COMPANY
Railway Labor Saving Devices
723 South Wells Street, Chicago, Ill.

F. Hackmann, Pres. and Mech. Engr.
J. J. Franzen Secretary and Treasurer

Sales Agents: Thomas D. Crowley Co. Peoples Gas. Bldg., Chicago

Foreign Representatives: Baldwin Locomotive Wks. Philadelphia, Pa.

The Hayes Light Portable Derail Model FB weighs 33 lbs. The block is of the same grade of malleable as other Hayes Derails. The screws and nuts are S.A.E. 1020 steel properly heat treated for strength and wear. Thorough engineering theory and experience have attended every detail of design. No tools are needed to put it in track and it will stay where placed. It gives dependable protection for car repairmen and for cars placed where there is no fixed derail.

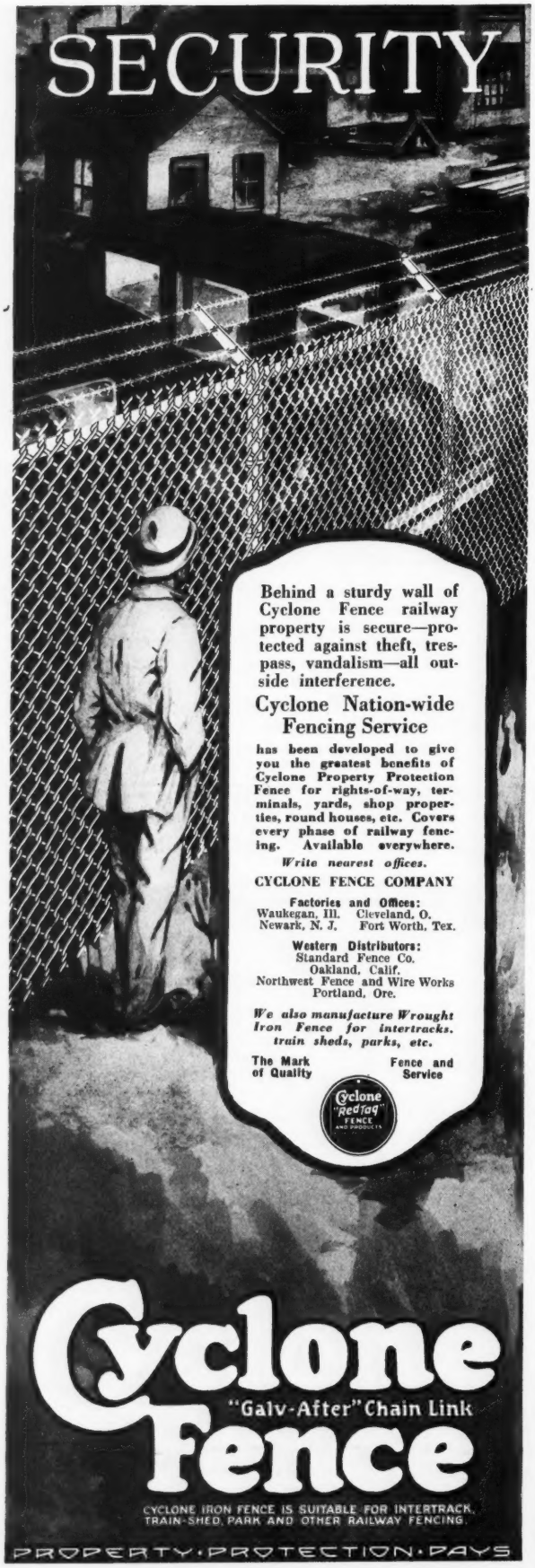
Hayes Track Appliance Co., Richmond, Indiana

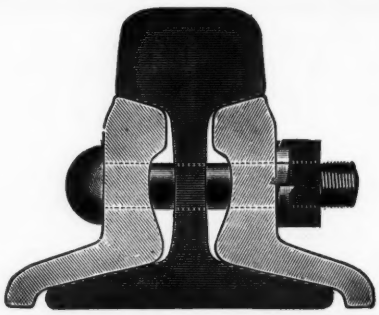
Two men with Jackson Electric Tie Tampers will tamp as many ties as eight men with picks.

The two men will also tamp more uniformly and more thoroughly so that the track will stand up for a longer time.
The Jackson Electric Tie Tamper not only saves labor directly, but also indirectly because of the greater permanence of its work.

Are you using tampers as labor savers?

ELECTRIC TAMPER & EQUIPMENT CO.
RAILWAY EXCHANGE CHICAGO, ILLINOIS


SECURITY
Behind a sturdy wall of Cyclone Fence railway property is secure—protected against theft, trespass, vandalism—all outside interference.
Cyclone Nation-wide Fencing Service
has been developed to give you the greatest benefits of Cyclone Property Protection Fence for rights-of-way, terminals, yards, shop properties, round houses, etc. Covers every phase of railway fencing. Available everywhere.
Write nearest offices.
CYCLONE FENCE COMPANY
Factories and Offices:
Waukegan, Ill. Cleveland, O.
Newark, N. J. Fort Worth, Tex.
Western Distributors:
Standard Fence Co.
Oakland, Calif.
Northwest Fence and Wire Works
Portland, Ore.
We also manufacture Wrought Iron Fence for intertracks, train sheds, parks, etc.
The Mark of Quality
Fence and Service
Cyclone "Red Tag" Fence and Products
Cyclone
"Galv-After" Chain Link
Fence
CYCLONE IRON FENCE IS SUITABLE FOR INTERTRACK, TRAIN-SHED, PARK AND OTHER RAILWAY FENCING.
PROPERTY·PROTECTION·PAYS



Positive Lock Washers

Use Positives and forget to worry about the damage caused by vibration. Positives are the cheapest protection and the best.

Plain type washers also

***The* Positive Lock Washer Co.**

Miller St. & Ave. A, Newark, N. J.

80 James Watt St.
Glasgow, Scotland

H. L. Van Winkle
160 Beale St., San Francisco, Cal.

DIXON'S SILICA-GRAPHITE PAINT

PIONEER AT ALL GRAPHITE PAINTS

Lowers paint costs per year of service by providing efficient protection for a surprising period of time.

It is a natural combination of silica and flake graphite for the pigment. The vehicle is pure boiled linseed oil. This pigment is inert, aids in preserving the original elasticity of the vehicle, increases the thickness of the paint film, and has long life.

Dixon's Paint will not peel, crack or flake off and is not affected by rust-producing agents, such as fumes, acids, dampness, etc.

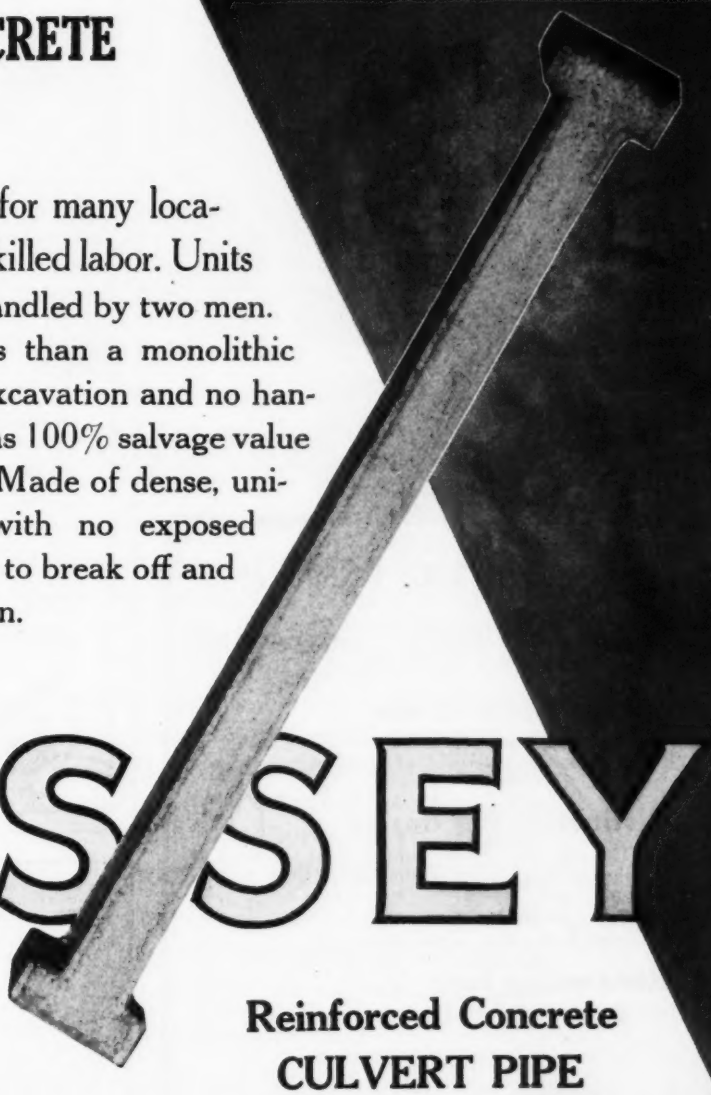
Write for Booklet 187-B.

JOSEPH DIXON CRUCIBLE CO.

Jersey City, N. J. Established 1827

REINFORCED CONCRETE CRIBBING

The ideal retaining wall for many locations. Can be laid by unskilled labor. Units are light enough to be handled by two men. Costs considerably less than a monolithic wall. Requires less excavation and no handling equipment. Has 100% salvage value in case of change. Made of dense, uniform concrete with no exposed metal or dowels to break off and start corrosion.



MASSEY

Reinforced Concrete CULVERT PIPE

Available in all sizes from 12 to 84 inches. Meets all culvert and cattle pass requirements. Requires less labor to install than other permanent structures and costs less. No maintenance. Made under ideal conditions in centrally located plants. Let us figure with you on your requirements.

Massey Concrete Products Corp.
Canadian Concrete Products Co., Ltd.

Peoples Gas Building
Chicago, Ill.

Transportation Bldg.
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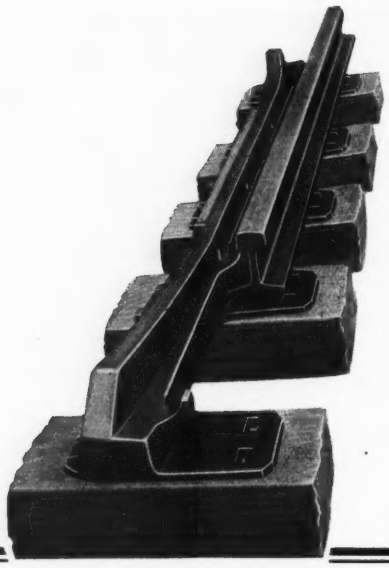


Consider These 3 Big Features of

ACCO ONE PIECE Guard Rail

1. Fifteen parts in one

The one piece construction avoids the high cost of installing and need of frequent maintenance found in ordinary guard rail.

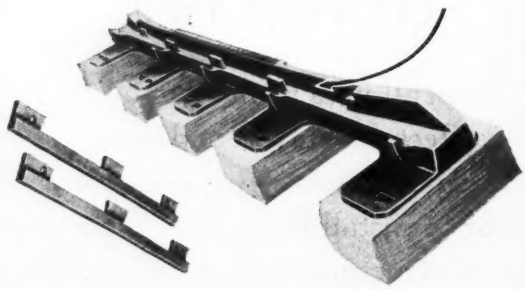
2. Distinctive lug design

The lugs engage the under side of the head of the traffic rail, preventing overturning of the guard rail.

The bottom side of the same lugs also securely engages the base of the traffic rail.

3. Renewable face

The manganese steel inserts insure long life and at the same time make possible easy replacement.



ACCO

A PRODUCT OF THE American Chain Company, Inc. in business for your SAFETY

READING SPECIALTIES DIVISION
AMERICAN CHAIN COMPANY, INC.
BRIDGEPORT, CONNECTICUT

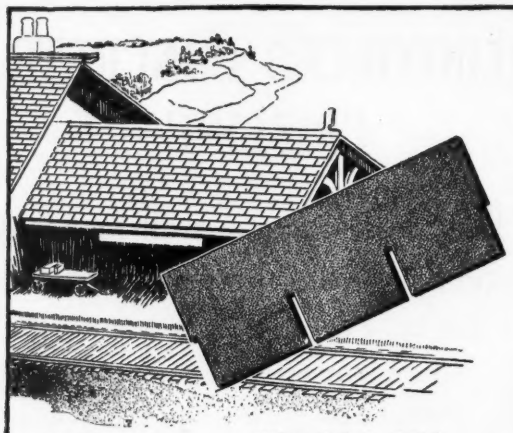
IN CANADA
Dominion Chain Co., Limited, Niagara Falls, Ont.

DISTRICT SALES OFFICES
Boston, New York, San Francisco, Philadelphia, Chicago, Pittsburgh

World's Largest Manufacturers of Welded and Weldless Chains for all Purposes and Makers of the Famous WEED Automobile Accessories

Other Reading Specialties

Cast Steel and Drop Forged Guard Rail Clamps
Replacer Clamps
Step Joints
Samson and Reversible Types of Rail Benders
Replacers



Manufacturers of
Mule-Hide Asphalt Shingles
Mule-Hide Asphalt Roll Roofing
Mule-Hide Built-up Roofs
Mule-Hide Insulating and Waterproofing Papers
Mule-Hide Waterproofing Membranes
Mule-Hide Saturated Burlap
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MULE-HIDE ROOFING AND SHINGLES

This Mule-Hide Giant 3-Unit Double Thick Shingle

Saves { 50% on Labor Cost
33⅓% on Nails

90 3-Unit Shingles cover the same area as:

900 ordinary wood shingles.
424 Individual shingles laid 4 inches to the weather.
340 Individual shingles laid 5 inches to the weather.
112 Regular 4-1 shingles laid 4 inches to the weather.

It costs just as much to apply a roof of inferior quality as it does to apply dependable ol' Mule-Hide.

Write for full size samples

THE LEHON COMPANY
Manufacturers Chicago

Visit the Coliseum

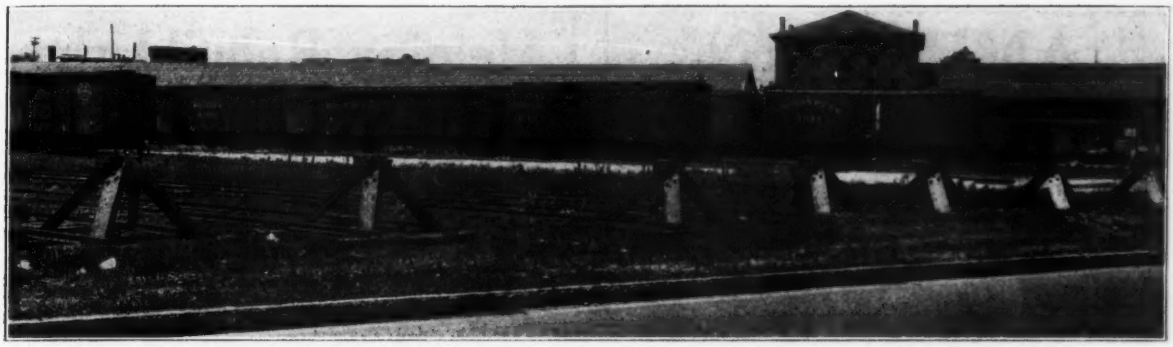
While in Chicago attending the convention of the

American Railway Engineering Association

don't forget to visit the

EXHIBIT
of the
National Railway Appliances Association
at the
Coliseum

You will be sure to see many things of great interest, and your visit will be appreciated by all exhibitors.



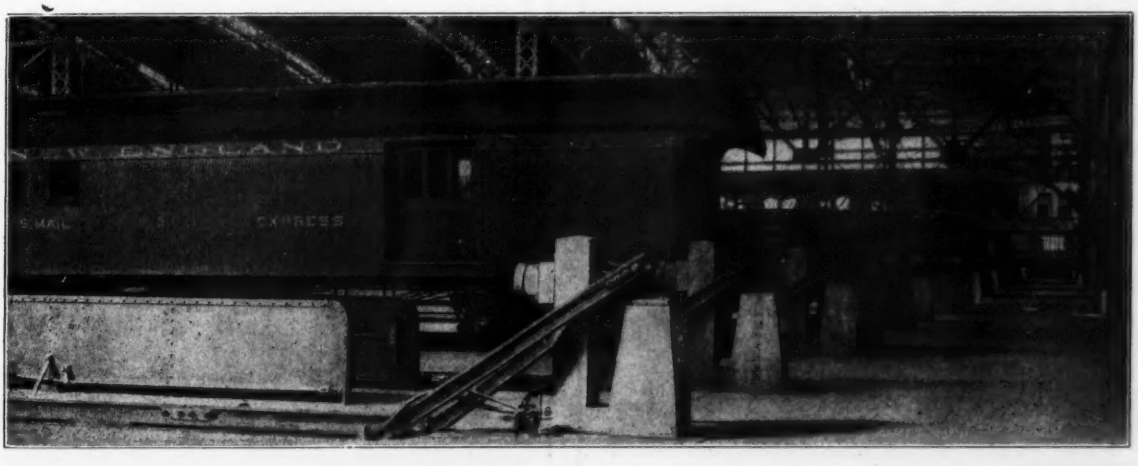
Labor Saving is not the Whole Story

SURE, the Ellis and Durable Bumping Posts are labor saving equipment. They save a lot of track labor required for replacing ties and rails, torn up by cars pushed over track ends. They save a lot of car department labor for repairing damage to such cars. But that's not the whole story. Ellis and Durable Bumping Posts prevent serious property damage in passenger stations, freight yards, trestle ends, industry tracks and many other locations where a car overrunning a track end would do much more serious damage than tearing up a track or putting a car out of service.

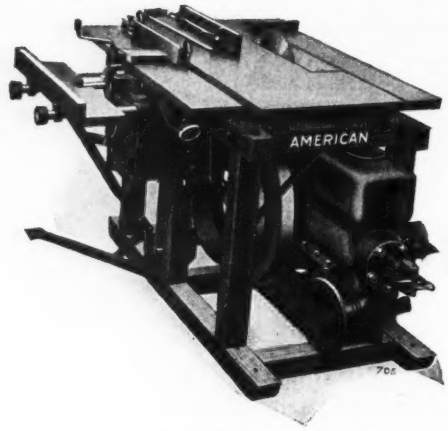
These two standard types of bumping posts meet every requirement. Standardize on them and use each to best advantage.

MECHANICAL MANUFACTURING COMPANY

Pershing Road and Loomis Street **Chicago, Illinois**



AMERICAN COST CUTTERS



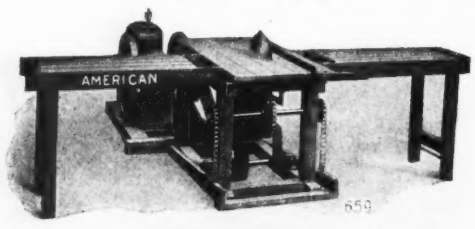
Portable Woodworker With Power Built In

Put this energetic "WORKMAN" on your pay roll. One that never sulks, nor grouches, nor asks for more pay. One that eliminates the hard manual labor of ripping, cutting-off and planing, and performs many other useful operations with surprising ease and dispatch.

Used by the most prominent construction concerns and railroads, such as Turner Construction Co., Stone & Webster, National Fireproofing Co., New York Central, Lehigh Valley, B. & O., P. & R., L. S. & M. S., C. B. & Q.

Ask for Bulletin No. 80, describing this and other cost cutters, for use on the job or in the shop or work car.

Combined Rip and Cut-Off Saw



SET FOR RIPPING

American Saw Mill Machinery Co.
164 Main Street Hackettstown, N. J.

Helping Rebuild the Railroads

Barber Brand Cold Repair Cement

Thousands of square yards of Barber Brand Cold Repair Cement—used as a surfacing for grade crossings, station platforms, foot walks, etc.—are being laid by railroads of the United States as part of their reconstruction programs.

Low in cost—durable—absolutely waterproof—Barber Brand Cold Repair Cement is also easily, quickly and inexpensively laid. It is used COLD—right from the barrel. No time or money wasted in heating. No cumbersome equipment needed.

Write at once for complete information regarding this remarkable product. Also ask for booklets describing other products of the Genasco Line.

THE BARBER ASPHALT COMPANY

Land Title Building, Philadelphia

New York Chicago Pittsburgh St. Louis
Kansas City San Francisco

PUMPS

A TYPE FOR EVERY SERVICE

Bulletins on request

THE GOULDS MANUFACTURING COMPANY

SENECA FALLS, N. Y.

GOULDS

Hand Weeding Is Antiquated and Wasteful

"HERBICIDE"

The Weed Exterminator

is used by large and small railroads in all parts of the country because of the effective and economical way it weeds track. With "HERBICIDE" and a Reade Spray Equipment a few men in a few days can do the work of hundreds. Three men and a train crew can average 50 miles of track a day and often more. "HERBICIDE" kills the roots as well as the tops, so one application lasts for a season. *Full information sent upon request.*

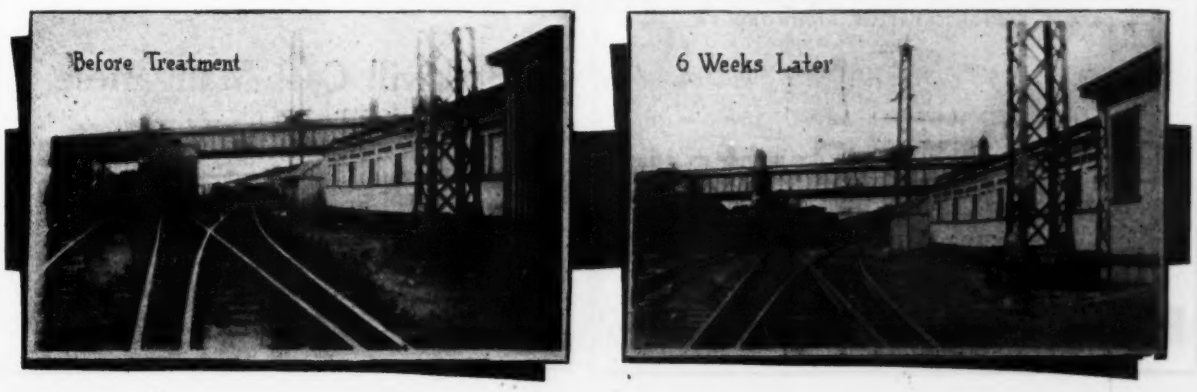
Make it a point to see our Exhibit at

SPACE 261

A. R. E. A. CONVENTION

Reade Manufacturing Company, Jersey City, N. J.

Works: Jersey City and Chicago



QUALITY

HIGH GRADE ASPHALTS AND OILS

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Sarco No. 6 Waterproofing
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REDUCE YOUR UPKEEP

A. C. L. FREIGHT STATION, RICHMOND, VA.

E. M. LONG & SONS CADIZ, OHIO IMPROVED O. G. FIR GUTTERS

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O. G. Fir Gutters

LOOK BETTER LAST LONGER
LESS EXPENSIVE

ASK FOR BOOKLET

E. M. LONG & SONS, Cadiz, Ohio

Kilby Frog & Switch Co.

Birmingham, Ala.

Manufacturers of

Railroad Crossings,
Frogs and Switches

Manganese Track Work
a Specialty

Balkwill Cast Manganese
Articulated Crossings

Graham Flange Frogs

(The Savers of Maintenance)

Requires Oiling Only *Once a Month!*

Flood Lubrication Multiplies Life

PATENTS PENDING

AT LAST! An Ideal Pump For Remote Control

The new GARDNER totally enclosed pump with motor drive may be located miles away from your right of way and controlled by an electric switch. It will need to be visited only once a month, to renew oil. It is the ideal pump for railroad water service and for all other service as well. Protected gears and bearings, and perfect flood lubrication, multiply life. Send for new bulletin, EP-1.

Territory Still Available to Agents

THE GARDNER GOVERNOR COMPANY
Quincy, Illinois

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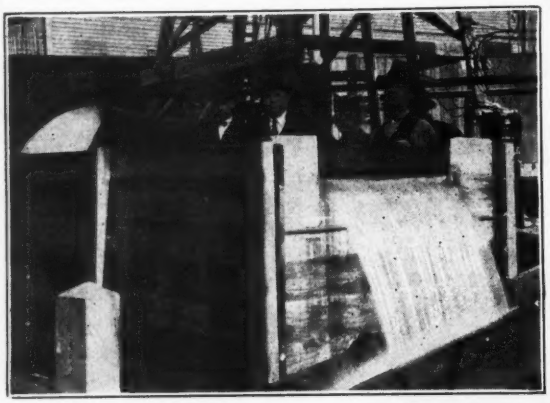
549 Washington Blvd.	524 Singer Bldg.	604 Arch St.	718 Heights Blvd.	400 Fourth St.	419 E. Third St.

GARDNER
GOVERNORS
PUMPS · COMPRESSORS

GARDNER



Another Layne Well for Illinois Central Railroad

On October 31st at the Illinois Central shops in Memphis, Tenn., a Layne Well delivered **731** gallons per minute on test, 231 gallons over the guaranteed production of **500** gallons.

The Illinois Central uses Layne Wells at Paxton, Pesotum and Champaign, Illinois.

Layne Wells also supply these Railroads as the stations listed

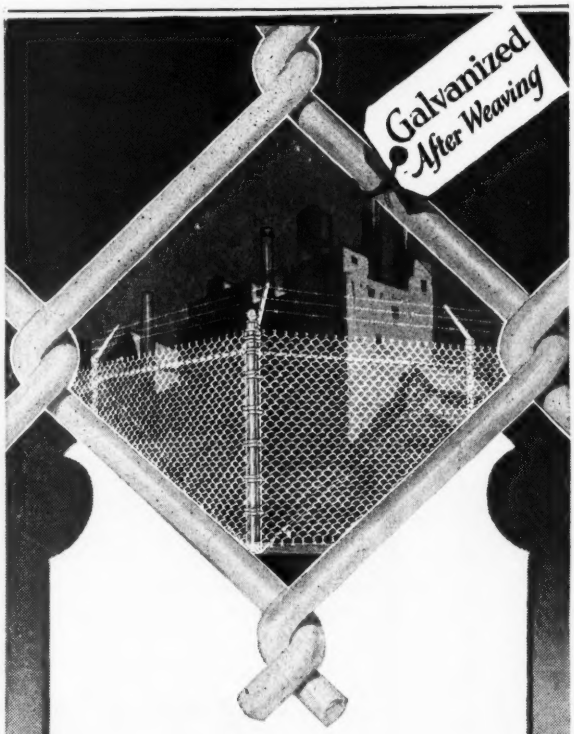
Missouri Pacific	Baltimore & Ohio
Dupo, Ill.	Baltimore, Md.
Van Buren, Ark.	Dayton, Ohio
Argenta, Ark.	Wellsburg, W. Va.
Little Rock, Ark.	Crown Point, Ind.
Lexa, Ark.	Garrett, Ind.
Paragould, Ark.	Chillicothe, Ohio
Chamois, Ark.	Parkersburg, W. Va.
Falls City, Nebr.	Ottawa, Ohio

LAYNE & BOWLER CO.

HOUSTON, TEX. MEMPHIS, TENN.
LOS ANGELES, CALIF.

LAYNE-BOWLER CHICAGO COMPANY.....37 W. Van Buren St., Chicago
LAYNE-OHIO COMPANY.....Wyoming Station, Cincinnati, Ohio
LAYNE-NEW YORK CO.....30 Church St., New York City
LAYNE-SOUTHEASTERN CO.....First Nat'l Bank Bldg., St. Petersburg, Fla.
LAYNE-LOUISIANA CO., INC.....St. Charles, La.
LAYNE-ARKANSAS CO.....Stuttgart, Ark.
LAYNE-CENTRAL CO.....Memphis, Tenn.
LAYNE-WESTERN CO.....Mutual Bldg., Kansas City, Mo.
LAYNE-TEXAS CO.....Houston, Tex.
LAYNE-BOWLER-WISCONSIN CO.....711 First Wisconsin Nat'l Bank Bldg., Milwaukee, Wis.
LAYNE-BOWLER-MICHIGAN CO.....Prudden Bldg., Lansing, Mich.

Anchor Fences



Certainly— Anchor Fences are Galvanized *After Weaving*

For this is the most modern method. Practically all manufacturers of chain link fence use it.

Galvanizing *after weaving* is essential. But the durability of a fence depends on other factors, too.

What is the fabric made of? How are the posts set? Today, these are the questions which the fence buyer should ask.

Anchor Chain Link Fabric is made of No. 6 *rust-resisting copper-steel* wire — an Anchor feature which offers maximum resistance against corrosion! The posts are *drive-anchored*—insuring permanent fence alignment!

Investigate these Anchor advantages before you buy. It will pay you. The nearest Anchor representative will gladly present the facts.

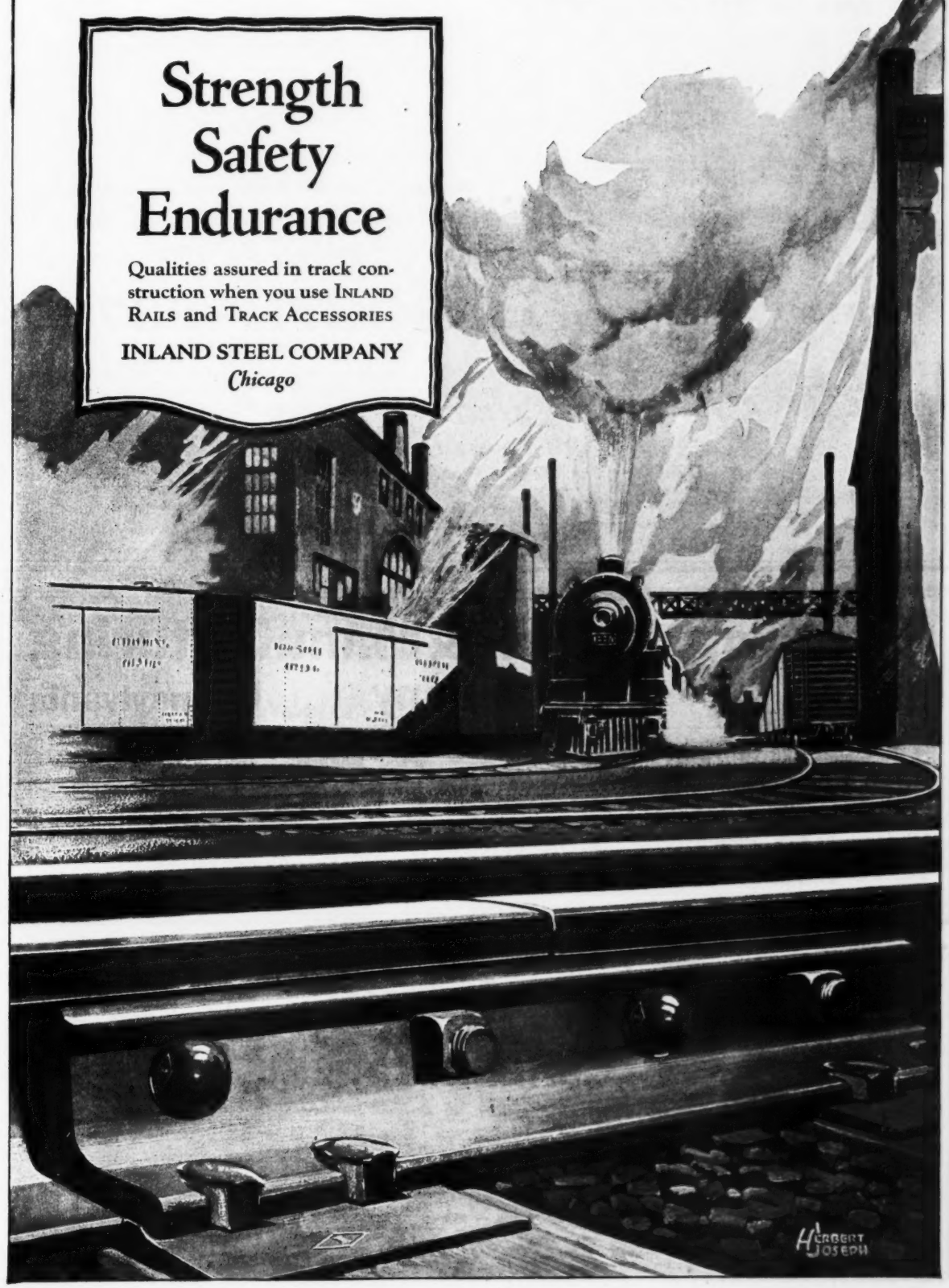
Anchor Post Iron Works
52 Church Street, New York, N. Y.
Branch Offices and Sales Agents in Principal Cities

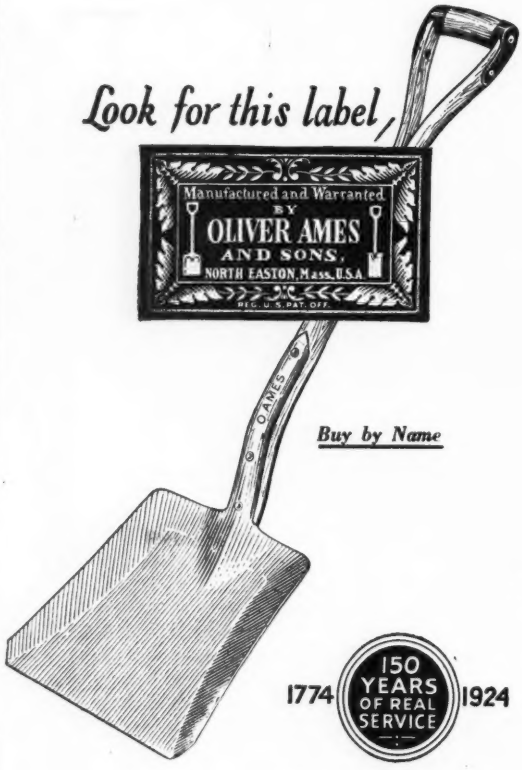
INLAND

Strength Safety Endurance

Qualities assured in track construction when you use INLAND RAILS and TRACK ACCESSORIES

INLAND STEEL COMPANY
Chicago





LOOK!

GENUINE

"O. AMES" BRAND

SHOVELS—SPADES—SCOOPS—DRAINAGE TOOLS

(The Standard for 150 Years)

Will Be Exhibited at the

Seventeenth Annual Exhibition

National Railway Appliances Association

at the Coliseum and Annex, Chicago, Illinois.

March 9-12, Inc., 1925

BOOTH—237

Make it a point to see this display of the finest shovels the world has ever seen: shovels that "dollar for dollar" represent the best investment you can possibly make in

SHOVEL SERVICE AND SATISFACTION

OLIVER AMES & SONS CORP.
NORTH EASTON, MASS.

(Ames Shovel & Tool Co., Boston, Owners)

Member of the National Railway Appliances Association

The Frog, Switch & Manufacturing Company

Carlisle Pennsylvania

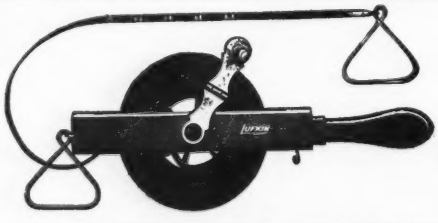
Established 1881

FROG AND SWITCH DEPARTMENT

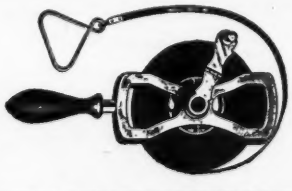
MANUFACTURERS OF
MANGANESE INSERT FROGS, CROSSINGS AND SPLIT SWITCHES
SOLID MANGANESE FROGS AND CROSSINGS
PLAIN FROGS, SWITCHES, CROSSINGS
SWITCH STANDS AND ACCESSORIES

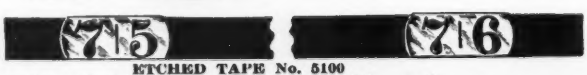
MANGANESE STEEL DEPARTMENT

MANUFACTURERS OF
"INDIAN BRAND"
HIGH GRADE MANGANESE STEEL CASTINGS
FOR FROGS, SWITCHES AND CROSSINGS
JAW AND GYRATORY CRUSHERS
CEMENT MILL, MINING MACHINERY, ETC.
GRAY IRON CASTINGS



LUFKIN CHAIN TAPES





ETCHED TAPE No. 5100
A sturdy tape best for all precise chaining work.
½-gage mark when specified.

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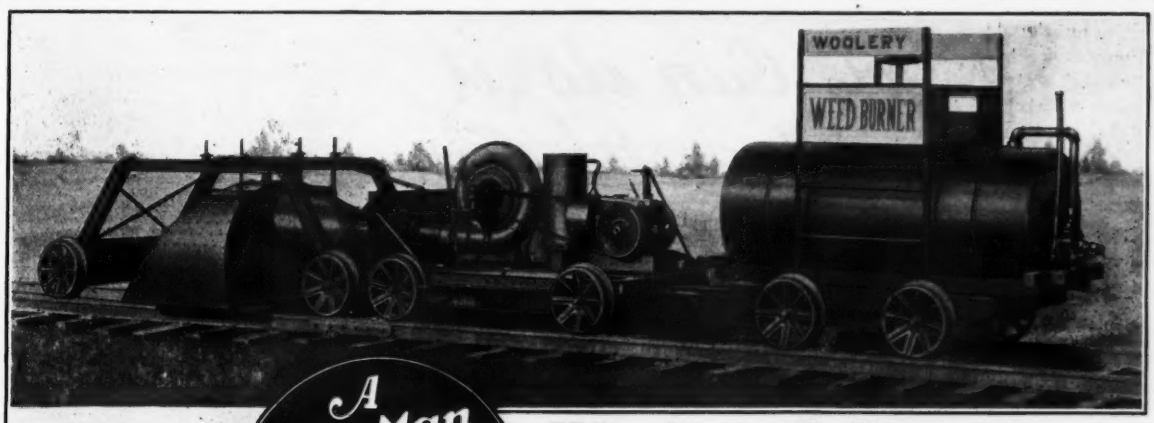

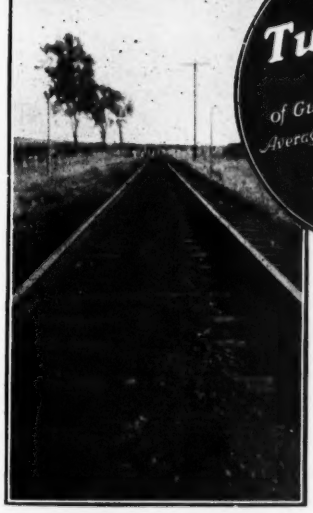

Note the clean, wide burned area that the Woolery leaves behind. In some places the weeds and crack grass had attained a height of 27 inches.

A Two-Man Outfit of Guaranteed Efficiency
Average cost on first heavy burning less than
$3.00 per mile

Woolery Railway Weed Burner

(Patent Applied For)

A Self-propelled, three-unit outfit operated by two men. Speed from 1 to 5 miles per hour for burning, and up to 20 miles an hour for travelling. Compared with large and cumbersome machines, the Woolery is light—quick—nimble. Being easy to handle and quick to fire it gets around and can be used in places and on short burnings where other machines would be impractical. It may be removed from track at highway crossings. Total length of outfit, about 34 feet.

High Lights on the Woolery Weed Burner:

A Three-Unit outfit operated by TWO men.
Burns Gas Oil, Distillate Oil or Kerosene, and fire starts instantly.
ONE large Oil Burner—never whips out by tall weeds.
Burns a strip 11 feet wide.
Average burning rate, 2 miles per hour.
Fire may be shut off when crossing bridges. No drip of oil.
Fire relights automatically when fuel is turned on.
Outfit carries supplies for a full day's operation.
Any speed from 1 to 20 miles per hour on its own power.
Easily loaded on a flat car for long moves.
Operation is simple and easily learned.
All steel construction—safe and dependable.
Low fuel consumption, thoro work, and no train crew.
A clean, dry, withering hot fire—leaves no oil on the rails.
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Chrome Nickel Steel Ball-Bearing Axles—Strong and Easy-Running.
Entire workings of machine controlled from Driver's seat.
It may readily be removed from track at a highway crossing.

Always Ready for a Demonstration on Any Railroad

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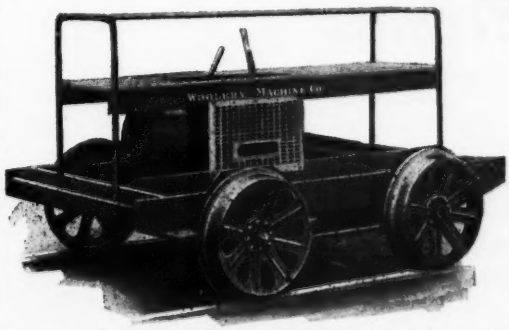

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Light in Weight—100 Per Cent Overload

A car for every road—for any Climate—for all kinds of Service. Power to meet requirements. It can be used as Section Car, Extra Gang Car or Small Work Train. Normal Capacity, 10 passengers. Instantly removable side seats which increases the seating capacity to 20 men, can be supplied. Chrome Nickel Steel Ball-Bearing Axles. Steel Hand Railing and Lift Handles, Steel Engine and Wheel Guards. Steel Truss Frame contributes enormous strength.

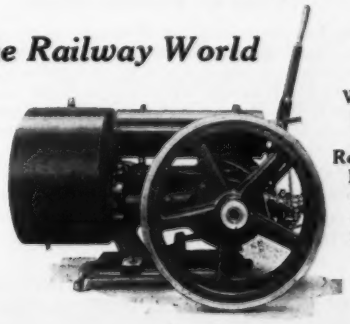
The Power Plants that Make the "Woolery" the Marvel of the Railway World

The Woolery Model "C" Reversible Engine

A powerful, light weight ball-bearing engine with speed control of from 400 to 1200 revolutions per minute. Develops 9 horse power on the break test. Designed to use gasoline, but works efficiently on a mixture of kerosene and gasoline.

The Woolery Model "TC" Twin Cylinder, Reversible Engine with Two-Speed Transmission

Ball-bearing, perfectly balanced, and smooth running. Develops 18 horse power on the break test. Admirably adapted to the heavier class of section and construction work, and is powerful enough to save a work train many trips.



The Woolery Model "C" Reversible Engine 9 h. p. on the Break Test

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The Woolery Machine Co., Minneapolis, Minn.

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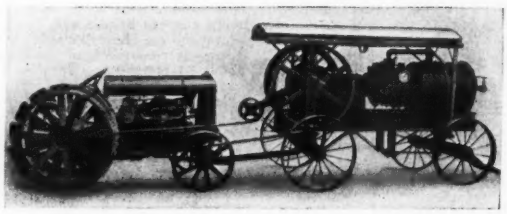
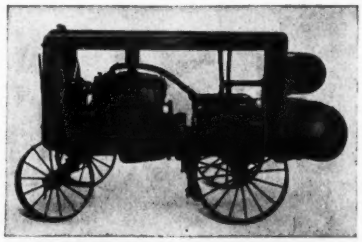
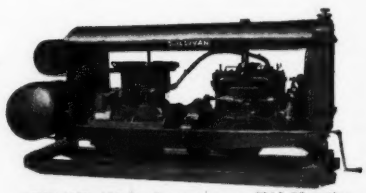


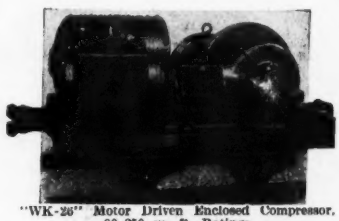
"WK-34" Compressor. Fordson Driven. 121 cu. ft.



"WK-314" 4-Cylinder "V" Type Compressor. 220 cu. ft. Rating



"WK-312" 110 ft. Compressor on Skid Mounting



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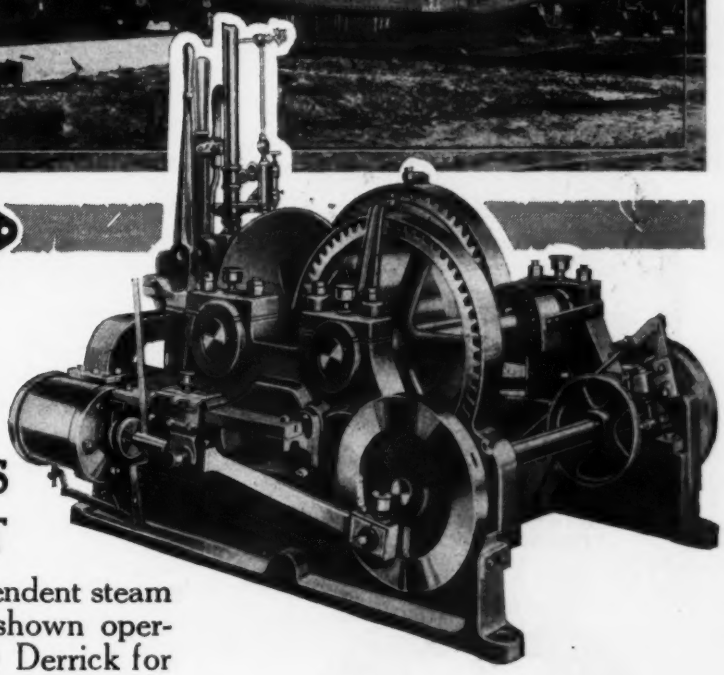

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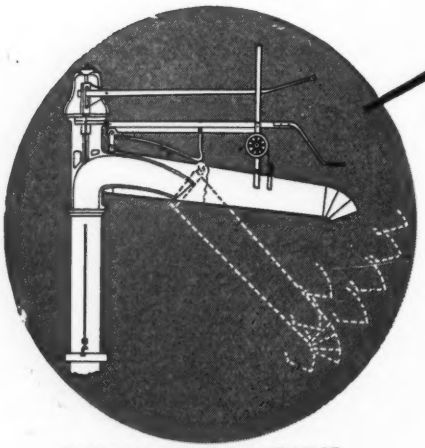

SHOWING VERTICAL RANGE
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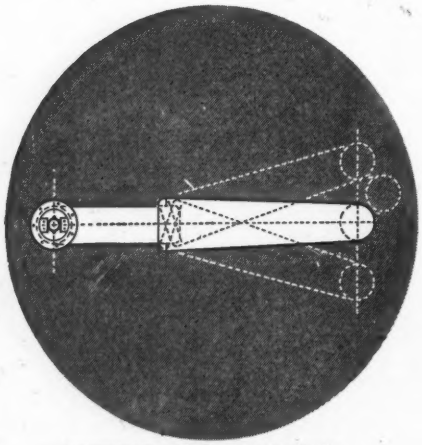

SHOWING LATERAL RANGE
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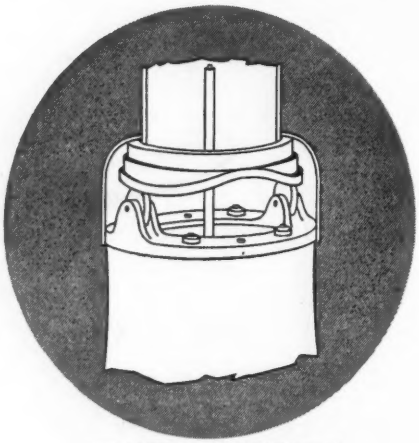

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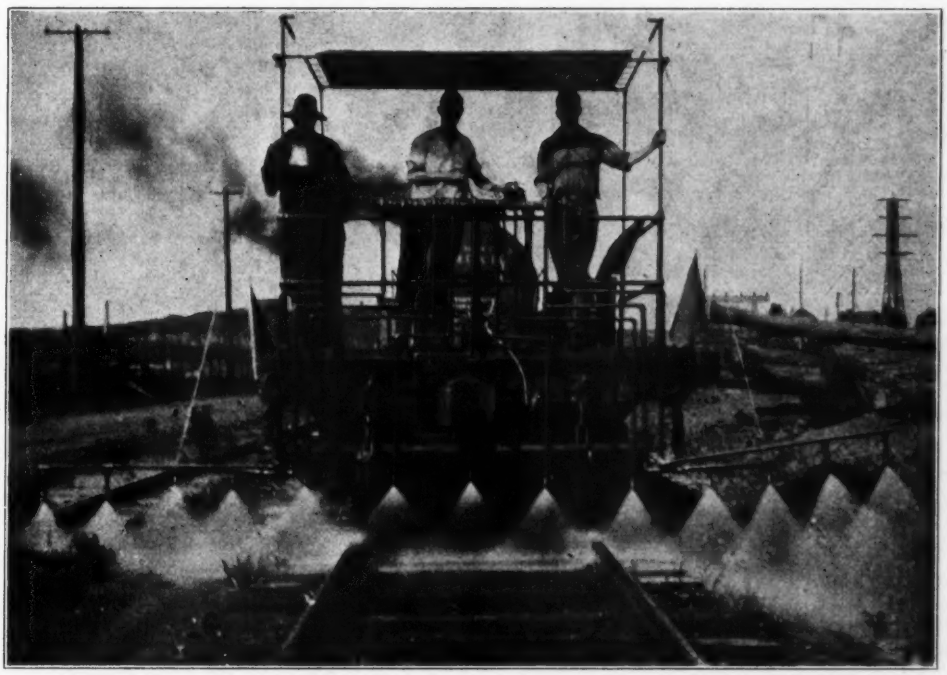

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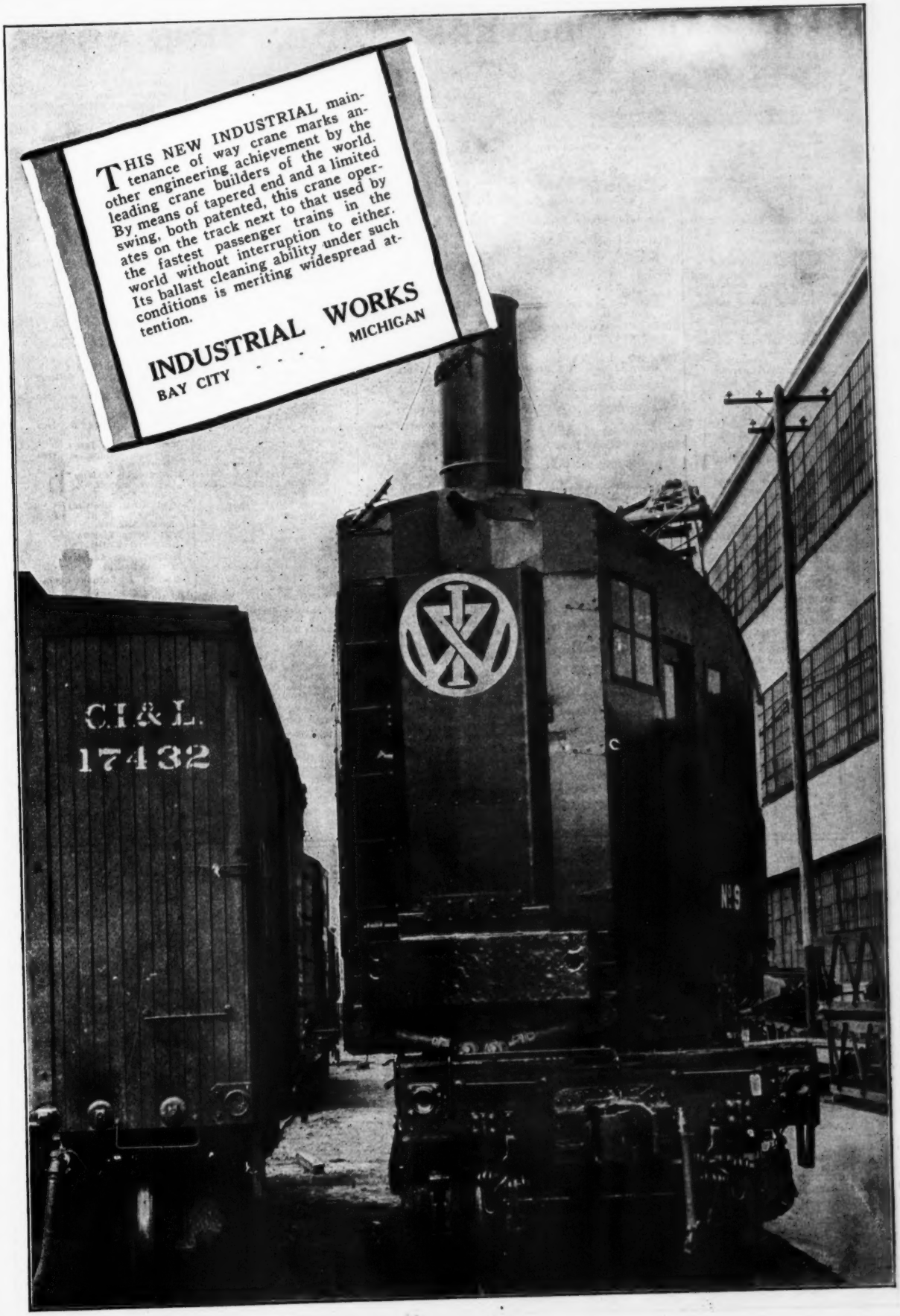
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International Creosoting & Construction Co.
Massey Concrete Products Corp.

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Posts, Fence.
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Du Pont de Nemours & Co., Inc., E. I.

Power Plants, Portable
Electric Tamper & Equipment Co.

Preservation, Timber.
International Creosoting & Construction Co.

Products, Gas.
Oxweld Railroad Service Co.

Pumps, Air Pressure and Vacuum, Centrifugal, Deep Well, Piston, Plunger, Rotary, Slump.
American Well Works.
Fairbanks, Morse & Co.
Goulds Manufacturing Co.
Gardner Governor Co.
Ingersoll-Rand Co.
Layne & Bowler Co.
Sullivan Machinery Co.

Push & Hand Car Bearings.
Hyatt Roller Bearing Co.

Push Cars.
Buda Co.
Fairbanks, Morse & Co.
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Co.
Woolery Machine Co.

Rail Anchors.
Lundie Engineering Corp.
P. & M. Co.

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Buda Co.
Q. & C. Co.
Verona Tool Works.

Rail Bonds.
Verona Tool Works.

Rail Braces.
Bethlehem Steel Co.
Buda Co.
Q. & C. Co.
Ramapo-Ajax Corp.
Wharton Jr. & Co., Wm.

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Rail Layer.
Maintenance Equipment Co.

Rail Laying Machinery
Clyde Iron Works

Rail Saws, Portable.
Industrial Works.
Kalamazoo Railway Supply Co.
Q. & C. Co.

Rail Springs.
Verona Tool Works.

Rail, Tee.
Bethlehem Steel Co.
Inland Steel Co.

Railings, Iron
Anchor Post Iron Works

Removers, Paint.
Mudge & Co.

Replacers, Car
American Chain Co., Inc.
Buda Co.

Rivets.
Bethlehem Steel Co.

Roller Bearings.
Hyatt Roller Bearing Co.

Roof Slabs.
Massey Concrete Products Corp.

Roofing Composition.
Barber Asphalt Co.
Lehon Co.

Rules.
Lufkin Rule Co.

Saw Mills.
American Saw Mill Machinery Co.

Saws, High Speed Friction.
American Saw Mill Machinery Co.

Saw Rigs.
American Saw Mill Machinery Co.
Fairbanks, Morse & Co.

Scales.
Lufkin Rule Co.

Scoops.
Ames Shovel & Tool Co.

Scrapers, Wheel, Drag and Buck.
Western Wheeled Scraper Co.

Screw Spike Drivers.
Ingersoll-Rand Co.

Section Cars.
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Sheathing, Paper
Barber Asphalt Co.

Sheet Iron.
Armco Culvert & Flume Mfrs. Assn.

Shingles, Composition.
Barber Asphalt Co.
Lehon Co.

Shovels.
Ames Shovel & Tool Co.

Signal Foundations, Concrete.
Massey Concrete Products Corp.

Skid Shoes
Q. & C. Co.

Slabs, Concrete.
Massey Concrete Products Corp.

Smoke Stacks.
Chicago Bridge & Iron Works.
Massey Concrete Products Corp.

Snow Melting Device
Q. & C. Co.

Snow Plows
Jordan Co., O. F.
Q. & C. Co.

Spades.
Ames Shovel & Tool Co.

Spikes.
Bethlehem Steel Co.
Inland Steel Co.

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Spreaders, Ballast.
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Standpipes.
Chicago Bridge & Iron Works.

Standpipes (Penstock).
American Valve & Meter Co.
Fairbanks, Morse & Co.

Stands, Switch & Target.
American Valve & Mater Co.
Bethlehem Steel Co.
Buda Co.
Q. & C. Co.
Ramapo-Ajax Corp.

Station Houses.
Massey Concrete Products Corp.

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Inland Steel Co.

Steel Plates & Shapes.
Bethlehem Steel Co.
Inland Steel Co.

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Concrete Surfacing Machinery Co.

Switches.
Bethlehem Steel Co.
Frog Switch & Mfg. Co.
Kilby Frog & Switch Co.
Ramapo Ajax Corp.
Wharton Jr. & Co., Wm.

Switch Locks.
American Valve & Meter Co.

Switchmen's Houses.
Massey Concrete Products Corp.

Switchpoint Protector
Fleming & Sons Co., Inc., J. R.

Switchpoint Straightener.
Maintenance Equipment Co.

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Chicago Bridge & Iron Works.

Tanks, Oil Storage.
Chicago Bridge & Iron Works.

Tanks, Water Storage.
Chicago Bridge & Iron Works.
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Lufkin Rule Co.

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Ties.
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Tie Plate Clamps
Q. & C. Co.

Tie Plates.
Bethlehem Steel Co.
Lundie Engineering Corp.
Inland Steel Co.
Sellers Mfg. Co.

Tie Rods.
Bethlehem Steel Co.

Tie Spacers
American Chain Co., Inc.
Maintenance Equipment Co.

Tie Tampers.
Electric Tamper & Equipment Co.
Ingersoll-Rand Co.

Timber, Creosoted.
International Creosoting & Construction Co.

Tool Steel.
Bethlehem Steel Co.

Tools, Pneumatic.
Ingersoll-Rand Co.

Tools, Track.
Buda Co.
Hackman Track Liner Co.
Maintenance Equipment Co.
Q. & C. Co.
Verona Tool Works.

Tools, Wrecking.
Industrial Works.

Tongue Switches.
Bethlehem Steel Co.
Buda Co.
Frog Switch & Mfg. Co.
Kilby Frog & Switch Co.
Ramapo Ajax Corp.
Wharton Jr. & Co., Wm.

Torches, Oxy-Acetylene Cutting & Welding.
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Treating Plants, Water.
American Water Softener Co.

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Fairbanks, Morse & Co.

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Fairbanks, Morse & Co.

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Fairbanks, Morse & Co.

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Water Treating Plants.
American Water Softener Co.
Chicago Bridge & Iron Works.

Water Tanks.
Chicago Bridge & Iron Works.

Water Treating Tanks.
Chicago Bridge & Iron Works.

Waterproofing Fabrics
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Lehon Co.

Weed Killer, Chemical
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Welding, Oxy-Acetylene.
Oxweld Railroad Service Co.

Welding & Cutting Equipment.
Oxweld Railroad Service Co.

Wheels, Hand & Motor Car.
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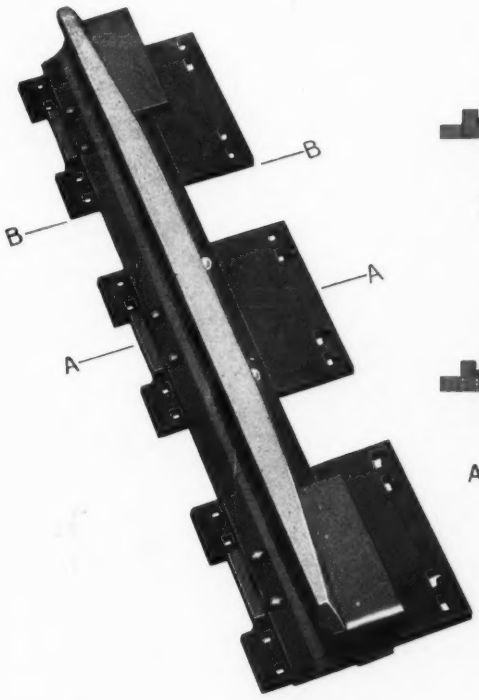

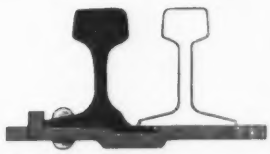

A-A
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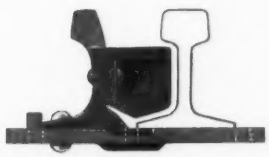

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ON TIES
AT FOOT GUARD

Bethlehem Hook Flange Guard Rail, Design 750

These Guard Rails may be installed by two men in one hour as compared with three to six hours required for the old style bolted or clamped guard rail. The main rail is jacked up, the guard rail slipped under, set to gage and spiked down—no other work required.

The Guard Rail itself is of rolled steel, with one flange rolled lower than the other, the lower flange hooking under the main rail and locking itself in position.

Bethlehem Hook Flange Guard Rail is strictly one piece with no bolts, clamps, or other loose parts to hunt or lose. It is carried on the stores record as a single item, complete in itself, as compared with the bolted or clamped guard rail, where there are bolts, nuts, plates, braces, clamps, and rail to be assembled. One-piece construction eliminates all bolt-tightening and clamp-adjusting maintenance expense.

Bethlehem Gage Rods, Designs 855 and 856

Bethlehem Gage Rods are used to prevent track spread, lengthen tie life, and hold the track to gage on curves—all labor saving features. The elimination of one derailment may mean the saving of 100 man-hours or more.

End adjustment makes these rods quicker to install and easier to draw up than the old style non-adjustable rod, which requires the pulling of all spikes to install. They are equipped with self-locked nuts which stay put, eliminating the periodical tightening of loose nuts.

Design 855, Non-Insulated Type, may be changed quickly and easily to Design 856, Insulated Type, by changing the clip.

Bethlehem Gage Rods, used for temporary tracks and repair work, shorten the time of "out of commission" tracks.

NON INSULATED - DESIGN 855

INSULATED - DESIGN 856

Bethlehem Products for railroads include Standard Sections and Light Rails; Switch Stands; Frogs, Switches and Crossings of built-up or manganese construction; Rail Braces; Angle Bars; Bolts, Nuts, Rivets and Spikes; Tie Plates; Tie Rods; Gear Blanks; Couplings; Freight Cars; and Rolled Steel Car Wheels and Axles.

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

What the angle bars say about Verona Rail Joint Springs

The angle bars in the big picture say:

"We are 100 lb. bars. Six years ago they put us in the Westward track of a well-known road and applied the bolts with ordinary nutlocks. We've carried 72,000,000 gross tons; but now we're worn out and must be replaced. They painted us white so that we'd show in the photo. The arrows point out how we've been drawn into the web of the rail at one end."

The angle bars in the small picture say:

"We are 100 lb. bars, too. Five years ago they put us in the Eastward track of the same road; but instead of using ordinary nutlocks, they secured our bolts with Verona Rail Joint Springs. The springs have cushioned the shocks, have equalized the load on the bolts, and have kept the joint tight. We've carried 30,000 gross tons. Wear? Sure! Naturally we've worn a little—but not much. And the wear has been *even!* We'll make a good joint for the life of the rail. Springs cost a little more than coil nutlocks but a whole lot less than angle-bars."

VERONA TOOL WORKS

Pittsburgh New York Chicago Boston St. Louis San Francisco
New Orleans Washington St. Paul Denver